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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, FEBRUARY 7, 1908.

Engineers and contractors who have occasion to use concrete piles would do well to read C. R. Gow's article in the October number of the *Journal of the Association of Engineering Societies*. He believes that the concrete pile has come to stay and must be accepted by the engineering fraternity as a permanent addition to the list of foundation expedients, but like all innovations it can be overdone through excessive enthusiasm and the desire to try something new. "Economic considerations usually demand that a concrete pile shall be capable of replacing at least three or four wooden piles. To do this it must carry safely a load of approximately 30 tons. But it must be borne in mind that the ground under and around the pile must ultimately carry this load, and since there is a limit to the carrying capacity of any soil, there must also be a limit to the load we can concentrate on one pile of ordinary section." This imposes severe demands on a small section of concrete, requiring particular excellence of construction. Few, if any, of the present methods of making and driving concrete piles are free from objectionable features; they also involve an element of risk. Concrete pile construction falls into two general classes—those built in place and those cast and driven. The former leaves some doubt as to the final sufficiency of the pile because of the inaccessibility of the space in which the concrete is placed and the uncertainty as to what takes place during and after placing the concrete. The second, while of assured quality of construction, involves a factor of considerable uncertainty in the driving. Different conditions require different methods, and careful study by the engineer is recommended before making a choice. The author of the article describes several methods used in special cases, explaining the reason for their adoption. In connection with one of these, where it was necessary to use cast piles, he records an interesting fact. Construction of the piles was begun late in the fall and an unexpected freeze caught a large number, some before initial set and all before final set. These lay exposed throughout the winter, alternately freezing and thawing. It was decided to make a test to determine the actual condition of the piles after such an experience. After thawing one and testing it immediately thereafter for crushing strength, with results that were not very satisfactory, another was thawed and then allowed to remain in a warm room for four weeks before testing. It made practically as good a showing as an unfrozen pile tested at the same time, indicating

that it had recovered practically full strength as soon as the freezing action was permanently removed. All the frozen piles were subsequently used.

"Thermostat," whose letter we print, makes a complaint which will fit a good many railroads, though he does not name a single one. As he speaks of the third rail his first incident must have occurred on the Long Island or the New York Central; and as his second happened at the Grand Central station, New York, it seems likely that he means the N. Y. C. But his grievance cannot be against that road, for it has a specific rule which forbids such neglect of passengers;* therefore by a "process of exclusion" the guilt is fastened on the New Haven road, which runs trains over the New York Central tracks. But, as we have said, the New Haven is not guilty above others; and, to be sober about it, we cannot swear that all N. Y. C. conductors fully and intelligently carry out Rule X. Like the Bible and the standard code, that rule lays down principles, but does not fit all cases with specific instructions. To do this it would need to be greatly amplified. On most roads another amplification would be necessary—that of the force of trainmasters. To educate conductors so that they will carry out with thoroughness the spirit of this rule, high grade trainmasters, who know how to improve petty practices without being petty-minded, should ride on trains very frequently, getting into real touch with the men. The trainmaster who has to supervise 500 trainmen has far too heavy a task. Taking Rule X. as it stands, the trouble is that in practice it does not come into action until passengers have already done a considerable amount of worrying. Telling passengers, after an hour, that they will be detained two hours longer, is all right, if that is the best that can be done; but the passenger demands, and often justly, that he shall be informed in 10 minutes of a delay of, say, 40 minutes, or be advised that conditions are uncertain. Possibly some reader will say that we are going pretty well into small details; but no New York Central officer can complain at this, for the "general notice" in the N. Y. C. rule book says that "the

*RULE X.—N. Y. C. & H. R. R.R. —Whenever the passenger service is disarranged the public shall be informed of the probable length of time of the interruption, and, when ascertained, the time the service will be restored. Notices from the superintendent received by station masters and station agents must be posted in a conspicuous place at the station. Announcement must also be made in waiting rooms and on platforms, and to passengers when purchasing tickets. Conductors of delayed trains must also inform passengers.

strongest recommendation any employee can have is, the fact that by . . . kindly accommodation of patrons he has secured the good will of the community." To do this, an employee must devote his days and nights to perfecting himself in what seem to be petty details.

TWO ANOMALIES OF A RAILROAD SITUATION.

At a time like the present when the country is in the penumbra of recent panic and when business is recessive the noun "contraction" becomes a kind of all-round watchword. Limiting the term to our railroads there is still for the word scope enough and to spare. There is contraction of train service, contraction of shop-work, contraction of improvements and contraction of credit measured by the high interest rate on the new railroad loan unless it happens to be very highly secured. The railroad manager is asking not as much what he can do as what he can do without—where he can economize most and where he can expand least, if at all. Such a situation always flings to the surface certain anomalies which just now, owing to somewhat exceptional causes, are peculiarly conspicuous.

The present stress in American railroading has followed close on two uncommon conditions, which to some extent have denoted cause and effect. One of them has been the era of corporation baiting shared by both federal and state authority and the first in a great degree an irritant and promotor of the last. In the states the anti-railroad hostility has in a measure calmed down. At Washington it would calm down but for the assertiveness and persistency of the executive, to use the mildest words of description. But public sentiment toward the railroad still remains sub-acute and exacting and pushes some anomalous and unjust demands. The railroad, hard pressed to pay moderate dividends, perhaps even to pay fixed charges, tries to retrench. But public sentiment resists the privilege which it concedes to the private corporation. The big factory may close and discharge its thousand hands and there is no public note save one of passing regret. But let the railroad take off a single unprofitable train and public outcry rises. Certain fundamental rights of private capital are denied to the quasi-public capital invested in the railroad. True, the railroad corporation has derived from the community, crystallized into the state, a charter that conveyed a franchise and certain privileges including that of eminent domain. But the railroad has shared with the public the task of making the franchise valuable; it has been attended with greater or less risk to the invested private dollar; and public necessity and convenience have been served by utilizing the franchise. Who will say that, under such conditions the private dollar publicly invested has not served a community better than the private dollar privately invested? Yet hard times and forced retrenchment give us the paradox of public pity for the one, public censure for the other, and that whether the company is poor or prospered, diluted by water or solidified by past reorganization and loss.

Another anomaly or at least novelty, in the railroad situation bears upon the attitude of the railroad corporations toward labor in the existing period of stress and strain. Prosperity, reaching over several years previous to the present recession, had produced the usual result of higher wages and more thorough organization as well as enlargement of the unions. Some of the railroad companies not only had raised wages a number of times but raised them last year not long before the financial flurry and its aftermath. The railroad corporations, therefore, face the dilemma of risking a strike by a general reduction of wages on the one hand, or, on the other hand, of reducing the hours or the number of hands or both. Ordinarily the first alternative would have been adopted. Under the peculiar conditions the railroads are now almost universally adopting the second, although they may be forced to general wage reductions later when the number of unemployed makes a strike more improbable or its effects, should it come, less serious. The results in the ranks of "highly organized" railroad labor are anomalous and impressive. Instead of the usual and orthodox scaling down of wages evenly distributed with the minimum of suffering there is now an uneven distribution. A certain number of hands retain their old hours and pay; others, not a few, retain the old rate but, with lessened hours, diminished absolute pay; and a large number are discharged and get no pay at all. Organization of labor on the railroads and the consequential dread on the part of railroad managers of an organized and costly strike has thus forced privation and hardship on the man out of work

instead of dividing them in a much lesser degree in reduced wages with the man who holds his job. One union man must starve that another union man may have the union wage.

The outcome of such an anomalous result of the theory of unionizing the railroad wage earners will be watched with interest as the enforced railroad economies proceed. As a disorganizing and weakening force on the unions its influence is manifest but that is only one branch of the general truism, that unions are strong during business prosperity and the reverse during adversity. The normal striker doesn't strike when another man is waiting for his job. But apart from that it will be instructive to see how far shorter hours, less absolute pay and imperilled work and wages brace up to greater efficiency the train man, shop man and track man. The head of a great railroad system not long ago called to his office the presidents of the unions, gave them some of the figures of reduced earnings, told them that many men must be discharged and that only greater efficiency of the men who remained would avert a sweeping reduction of the wage scale. That, in substance, represents the position of a good many heads of railroad corporations who front, not without grave solicitude, earnings that have run down while fixed charges, including wages, have run up. But anxiety has just now its place in the councils of organized labor as well as in the offices of railroad presidents.

SOME CAUSES OF WHEEL SLIDING.

The development of the high-speed brake, using increased brake pipe pressure and greater leverage in the foundation brake gear, has caused a gradual increase in initial brake shoe pressure up to more than 100 per cent. of the light weight of cars. Theoretically this high initial braking pressure should not cause flat wheels during ordinary stops from speeds above 40 miles an hour even under unfavorable conditions of wet rail, because the time required to bleed off the pressure in the brake cylinders through the high-speed reducing valve is less than the time required to reduce the speed to the point where the coefficient of brake-shoe friction begins to rise rapidly. Nevertheless flat wheels do develop, and frequently the size of the flat spots is such as to indicate that the wheel has skidded almost from the beginning of the stop. The not uncommon sliding for a car length at the end of the stop is not sufficient to produce a spot from 2 in. to 4 in. long, even with a sanded rail.

There are a number of causes of wheel sliding with these high braking pressures, which may occur singly or in combination. Some of them have not developed heretofore because the margin of safety between the braking pressure and the braking weight was great enough to take care of slight variations from the theoretical calculations of leverage and friction. They are nearly all due to defects in the design of the foundation brake gear, which is an equalized unit, while the wheels to which the brakes are applied are separate units.

In the usual arrangement of foundation brake gear the rod connecting the floating lever and the truck live lever pulls in a line from 14 in. to 17 in. to one side of the center of rotation of the truck. If both trucks rotate simultaneously and equally, the combined effect is neutralized, but if for any reason one truck turns more than the other when the brakes are set up hard there is an instantaneous increase in the brake-shoe pressures on the rotating truck which may be just enough to cause the shoes to lock on the wheels.

Every one who has watched the action of a truck when the brakes are applied has noticed the tilting which occurs, forward with outside hung brakes and backward with inside hung brakes. This results in a change in the static wheel loads, relieving the wheels under the high end of the truck of an appreciable part of their normal load. The brake-shoe pressure, however, is equalized and is the same for the lightly loaded wheels as for the heavily loaded wheels. This is perhaps the most common cause of flat wheels.

If the brake-shoe pressure is constant and at a maximum any instantaneous decrease in the pressure between the wheel and the rail may cause the wheel to lock. A bad joint in the track will cause the wheel to leave the rail altogether for an instant of time and give the brake-shoe a chance to take hold even though the opposite wheel on the axle is still carrying its normal load.

The method of hanging the brake-shoes below the center of the axle gives in effect a powerful wedging action to the shoe, which tends to drag under the wheel. There is no logical reason for this long continued practice except perhaps the limited clearance

between wheels for inside hung brakes. Some experiments on street car trucks made a few years ago proved that brake-shoes hung opposite the center of the wheel were very effective in preventing flat wheels, even though a more powerful brake was used.

Sticking triple valves, giving undesired quick action applications at slow speed, are also a source of some trouble. The remedy is more frequent cleaning and oiling than was formerly required. With an increase in brake-pipe pressure from 70 lbs. to 110 lbs. there is a much greater pressure on the triple valve slide valve and this causes the oil to be forced out from between the valve and its seat in a short time. The valve sticks and does not respond to a light service application, but if this is followed by another application the valve jumps into quick action and is followed by all the other valves in the train.

CAUSES OF THE TERRA COTTA COLLISION.

The Interstate Commerce Commission gives in its annual report (see page 177 of this issue) what seems to be intended for its final conclusion on the Terra Cotta collision (Dec. 30, 1906); but as a résumé of the facts this statement is brief and incomplete, and as a decision it is still less complete. As this collision is one of the most notable of recent years and as it occurred on a block signaled line (the telegraph block system) it seems desirable that the facts and circumstances should be fully summarized.

The essential facts of the collision itself were given in the *Railroad Gazette* of January 11 and 18, 1907. These may be summarized as follows: Eastbound passenger train No. 66 of the Baltimore & Ohio was making its regular trip, on Sunday night, December 30, 1906, and had just made its stop at Terra Cotta station, about three miles west of the terminus at Washington, D. C. The time was between 6 and 7 p. m. and there was a dense fog. This train was run into at the rear by a following train of empty passenger cars, headed by engine No. 2120. Neither the engineman nor the fireman of No. 2120 saw the tail lights of No. 66, and the passenger train was pushed forward several hundred feet and its three cars wrecked. Forty-three passengers were killed and 67 injured. The stations involved, beginning at the west, are:

Silver Spring, day and night block office.
Takoma, 1.2 miles, day block office.
Terra Cotta, 3.2 miles.
University, 4.3 miles.
Q N, 5.3 miles, day and night block office.

The grade is descending from Silver Spring to Terra Cotta at about 1 per cent., with some irregularity. At Takoma the block signal usually is not operated at night after 6:30 p. m., the signal being at that hour (or soon after) put clear and the light extinguished. At Silver Spring the block signal is on the left of an engineman approaching from the west. At Terra Cotta there is a crossover, and at night, when Takoma is closed, it was the custom to give to all eastbound trains at Silver Spring, a permissive block signal indicating that the block through to Q N must be traversed under control and that a train may be switching at the crossover. The ordinary permissive signal is a green light, but in cases like this, where it is desired to give a special caution concerning a crossover, two green lights are displayed, the second being a lantern hanging on the signal post about 10 ft. above the ground. The signalman at Silver Spring gave to No. 2120 (as he had also given to No. 66) a white (clear) signal at 6:28 p. m. At 6:31 this train passed Takoma, the signal there being at red, but evidently not seen by either the engineman or the fireman; and the train passed that station at high speed and evidently continued at unchecked speed (though not using steam) until the collision occurred.

These are the facts as shown by the testimony of the signalmen, which was not shaken, and they indicate that the engineman of No. 2120 was not keeping a good lookout. This engineman had been on duty 48 hours with the exception of two periods of four hours each. During these two periods he had opportunity to sleep. During one or two other short periods he had been waiting, with no duties to perform, but had not slept. The statement of the signalman at Takoma, that his signal showed red and that the train passed his station at 6:31 at high speed was well corroborated by other testimony. The General Manager of the road in testifying before the Commission, accepted as correct the statements of the signalman at Silver Spring.

The enginemen tell a different story. Engineman Hildebrand, of No. 2120, claimed that the signal at Silver Spring was "double green"; that the time was past 6:30; and that, therefore, he was

not bound to look for a signal at Takoma. All he would say concerning the indication of the Takoma signal was that he saw nothing as he passed there. But, on his own testimony, he was negligent in not approaching Terra Cotta with speed under control, there being a crossover there. Engineman Vermilion of No. 66 also testified that he had received a "double green" signal at Silver Spring, and that, therefore, he had concluded that Takoma had been closed for the night. But he acknowledged finding a white (clear) signal at Takoma, which, he said, surprised him. In view of the unshaken testimony of the signalmen, the most plausible explanation of the testimony of Engineman Vermilion and of the two firemen, who corroborated the testimony of their respective enginemen, is that they desired to support the theory which Hildebrand depended on to clear himself.

Engineman Hildebrand and also the conductor, the fireman and one brakeman of his train were indicted in the District of Columbia and tried for manslaughter, but, on December 23, 1907, were acquitted, after a trial lasting three weeks.

We make this summary at this time because, on account of the incompleteness of the Interstate Commerce Commission's report, and the unsatisfactory result of the criminal trial, railroad officers who are interested will, presumably, desire to form conclusions of their own. By reading again the testimony which we published a year ago, they can readily do this. The unreliable character of the trial before the court and jury is perhaps sufficiently indicated by the fact that, notwithstanding the clear indications of the preliminary inquiries, all the members of the crew of train 2120 were tried.

It is scarcely necessary to point out that the overwhelming preponderance of the support given to the signalmen's testimony goes to show that the opposing testimony was false. This conclusion is reinforced by the statement of the engineman's hours, raising a presumption that while running down grade he would easily fall asleep; and by the fact that, on his own testimony, he was running at dangerous speed. The Interstate Commerce Commission rightly calls attention to the employment of inexperienced block signal men, and to other collateral facts, but does not cite all of these facts, nor does it give sufficient emphasis to those that are cited. It is proper to recall these, for the testimony as a whole revealed loose or improper practices which go far to explain how such gross disregard of rules could come about. For example the omission to call to account enginemen who overran block signals appeared to have been common. An engineman who was willing to work excessive hours, at the risk of becoming too tired to attend to his duties, seems to have found it easy to do so, no vigilant officer being on watch to prevent such a dangerous practice. The practice of giving permissive signals constantly, even when clear signals could have been given, evidently tended to relax respect for the block signal rules, as one would naturally expect. Finally, the rule to regularly extinguish the Takoma signal light at 6:30 p. m., though not contributing to this collision, is shown to be one which ought to be changed. The worst result from it in this case was that it gave an opportunity to juggle with the facts as to the exact time that the trains passed different points. It is fundamentally unsound in that it permits an engineman to treat the absence of a signal as indicating "all right." This condition may seem to be provided for, when the order tells enginemen to treat such a block signal as though it were non-existent, but this is of questionable propriety, for whenever, by the light of the moon, or otherwise, the semaphore arm can be seen, the arm and the lamp seem to convey conflicting requirements. Even if the whole signal, post and all, were to be taken down and laid in the ditch it would still be desirable to have at that point some visible thing which the engineman could be required to see and to take note of. Again, the safety of the rule permitting enginemen to ignore a signal depends, in part, as was shown in this case, on their having accurate timepieces; whereas the block system should be safe regardless of inaccuracies in enginemen's watches.

The rule requiring passengers to show their tickets on entering the cars, which was adopted in the state of Missouri by the Chicago & Alton Railroad, December 1, has now been in force two months, and an officer of the road informs us that it has worked successfully. There is no friction or trouble and the people comply willingly. The circular which was issued announcing the change gave instructions that for the first week conductors might hold trains if necessary to allow passengers to go back to the ticket office to buy tickets, but it does not appear that serious delays were caused in this way. The reason why this new rule is necessary is that the law of Mis-

souri, limiting passenger fares, forbids the railroads to charge an excess fare to passengers paying cash on the trains. Not being able to employ this inducement to buy tickets the company found itself confronted, on the advent of the 2-cent law, by a tremendous increase in the amount of cash fares, making it impossible in some cases for the conductors to make their collections. A number of local stations furnished an average of 30 cash-fare passengers a day to certain trains. While, as in this case, the cash-fare evil is aggravated to some extent by the laws of the states, it is troublesome even where the railroads are free to adopt their own corrective measures, and it is much to be desired that such a rule should be adopted in a great many other places; that is to say, everywhere that it is possible to require such practice without causing serious delays to trains. The Alton tried a scheme of this kind ten or a dozen years ago, and, if we remember correctly, had it in force for a number of months on nearly or quite the whole of its lines; but there was considerable objection and we believe trains were delayed somewhat; and after a short time the old practice was resumed. It looked as though a good deal of the objection was based on other than sound and honorable reasons, and it can hardly be said that the experiment was continued long enough to warrant the acceptance of the apparently unfavorable results as conclusive.

Paul Kelly, the motorman of the elevated train of the Interborough Rapid Transit Company, New York City, which was wrecked at 53d street and Ninth avenue on September 11, 1905, has been tried, convicted and sentenced to state's prison for not more than two years and six months and not less than one year and six months. Kelly absconded immediately after the accident, but was persistently followed through many distant cities, and at last was captured. This accident, in which a dozen or more passengers were killed, one car falling into the street, was due to excessive speed on a sharp curve, the curve which leads from the Ninth avenue to the Sixth avenue line. Kelly's train was bound south on the Ninth avenue line, which is straight; but the switch was set for Sixth avenue, and Kelly passed around the curve without slackening speed. Home and distant signals were set against him. These signals consisted of lamps turning on vertical spindles. The side of the case of the lamp (the distant signal painted yellow and the home signal red) constituted the daylight indication. Kelly had been in the service of the road six months, running only on the Ninth avenue line. His previous experience had been on electric cars in St. Louis.

NEW PUBLICATIONS.

Course d'Economie Politique (Course in Political Economy). By C. Colson, Engineer in Chief of Highways and Bridges, State Councillor, Paris, Gauthier-Villars; 6th vol., 527 p., 6½ in. x 10 in.; paper cover. Price, 6 francs.

This volume is one of a number of books, forming together an encyclopedia of public works in which such questions as water supply, railroads, physics, steam engines and locomotives, bridges and masonry and the like are discussed. This sixth volume of the course on political economy deals with public works and methods of transportation, and by public works are meant all those that are executed for the purpose of general utility, by the organizations of collective interest. The book opens with an explanation of its scope and plan, and shows the distinction that should be borne in mind between works that are executed solely by the public through its own servants and by its own means, for its own use and behoof, and those works which are of a *quasi* public character but are executed by private enterprise, by virtue of a formal delegation of the public power, as in the case of England and the United States where the situation is quite different from that in France. In these English-speaking countries the companies have no contract with the state, they are proprietors in perpetuity of the works which they build, they usually fix their own charges and subsidies and a division of profits is rare. But any public service, howsoever it may be organized, can be viewed as coming within the domain of political economy, because it is always possible to calculate its money value, at least approximately, as well as its usefulness to the community or nation. Questions of this character are treated in the first seven chapters in so far as they relate to methods of communication. In this there is an attempt to determine the cost of transportation theoretically, and there is a discussion upon the influence of tolls on services rendered, and an inquiry into the principle of making those who profit by the facilities pay the cost in contradistinction to taxing the public for the maintenance. There then follows a general resumé of the situation in the matter of highways of communication in France, and in some foreign countries, with especial reference to the standpoint of traffic, expense and receipts. This is done from both a practical and theoretical point of view. The discussion of this question is at first limited to an investigation of the utilitarian value of a proposed work, and an inquiry into the elements which enter into the cost of transportation, the lowering of which represents the sole direct benefit accruing from the creation of or an improvement in the means of

communication, and to which the indirect benefits must be added.

This is followed by an expose of the methods to be pursued in order to keep the receipts as high as possible in comparison with the taxes, without impeding traffic, and without falling into an arbitrary method of handling it in the establishment of the rates. An examination is also made into the effect of a multiplicity of enterprises that are intended to serve the same needs, and the agreements that may be made between them. The question of the extent to which private enterprise may be associated with public service is handled in a way to show the advantages and disadvantages that may be presented by exploitation by the state or by corporations, as well as the object and character of the control that should be held in the hands of the public. This portion of the subject is concluded by a study of the various methods that have been attempted for the exercise of this control and association of the two interests from a financial viewpoint, such as subsidies, guarantee of interest and a division of profits. Finally in the last chapter there is a summary of the principles that have been set forth relative to means of communication, showing how they may be applied to the distribution of water, gas, compressed air or the electric current. It is also shown, at the same time, how these same principles extend to such enterprises as the establishment of sewers, the draining of swamps, the construction of levees to prevent inundation and the regulation of streams where the direct benefit accrues to a certain locality, but which differ in the fact that those who participate in them do not necessarily do so voluntarily, as may be said of travelers, and the consumers of water and gas, but, because they are located in a certain locality, must share in the results perforce, so that, in order that all interested may share in the expense, it becomes necessary that their contribution shall be a forced one, and shall not partake of the nature of a payment for services rendered, and yet it must be a direct rather than an indirect tax.

Naturally the book is based upon the conditions of affairs as they exist in France, in comparison with conditions in foreign countries, and in the use of such comparisons a warning is issued against drawing conclusions too quickly, because it is always necessary to consider the differences of national customs, temperament, legislative tendencies and the general organization existing. The work concludes with a plea that the principles of political economy should always be considered, in order that the future of liberalism and civilization may be insured.

Einfluss der Armatur und der Risse im Beton auf die Tragsicherheit. Mitteilungen aus dem Koeniglichen Material-Prüfungsamt zu Gross-Lichterfelde, West, bearbeitet und besprochen von E. Probst, Zivil-Ingenieur. 77 illustrations, 9 plates. Berlin: Julius Springer, 1907.

The use of reinforced concrete is recent and as compared with the use of masonry and of iron in structures there are many points that require exact determination. Reinforced concrete is not a homogeneous material, its value for structural purposes depending on its composition, the manner of making the concrete and on the character and position of the reinforcing iron. It was for the purpose of obtaining precise data for deductions as to some of the important points on which the use of concrete and of iron in conjunction depends that the tests detailed in this monograph were made. They were carried out at the Royal Testing Station at Gross-Lichterfelde West, their scope and character were planned jointly by the author and Mr. A. L. Johnson, of St. Louis, Mo. The results of the testing station are given in tabulated detail, the mathematical deductions are those of E. Probst. The engineer and the investigator in the field of structural materials will find both worthy of study.

It will be of interest and may be an inducement to consult the original to give a short sketch of the ground covered. A detailed description of the materials used in the concrete, the proportions of these materials, the character and dimensions of the reinforcing iron and the manner of preparing and the dimensions of the test pieces is given. Preliminary tests were made on a large number of prisms and cylinders to determine the tensile, compressive and transverse strength, together with the modulus of elasticity of the concrete. Four different kinds of iron bars were used: plain round, square twisted (Ransome), bulbous (Thatcher), corrugated (Johnson), each kind being tested to determine its modulus of elasticity, its elongation and its tensile strength. The main tests consisted in determining the transverse strength of reinforced beams, experiments as to the liability to corrosion in the iron after fissures had been developed, bending tests to determine the capacity of adhesion between concrete and the different styles of bars.

The graphic and mathematical interpretations and analyses of the results are the work of E. Probst and the testing station is in no way responsible for them. They are given in extended detail and are clear and comprehensive. His discussion ends with a calculation, based on his deductions, of the factors of safety secured by following the official formulae governing reinforced concrete work in Germany, Switzerland and France. The nine plates give autotype reproductions of photographs showing the condition of the test pieces after the test in about one-eighth to one-quarter natural

size, and the illustrations and diagrams throughout the work are ample and clear.

E. F. E.

Proceedings of the Society for the Promotion of Engineering Education. Vol. XV.; 690 pages; 6x9; cloth. Edited by Charles S. Howe, Arthur L. Williston and William T. Magruder.

This volume consists of the proceedings of the fifteenth annual meeting, held in Cleveland, Ohio, last July. There are the usual lists of officers, committees and members, followed by about 50 papers and the discussions. Most of the papers deal with methods of teaching, but some of them go into wider fields. The authors, with a few exceptions, are members of the faculties of technical schools and colleges.

CONTRIBUTIONS

Wilson's Curve and Switch Tables.

Chicago, Jan. 29, 1908.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to a letter from Mr. S. S. Roberts, printed in your issue of December 27, 1907, in which he calls attention to errors in the explanation of the Curve and Switch Tables published in your issue of November 8, 1907, I wish to state that the line under the expression "CC-2G" was intended to act as a vinculum or the equivalent of a parenthesis, making the formula the same as the one given by Mr. Roberts, namely, N (CC-2G).

The explanation of the combined uses of tables I. and II. is for a turnout from the outside of the curve and not from the inside, the mistake being a stenographic one in the copy furnished you.

In the sixth line from the bottom of the second column, page 552 (issue of Nov. 8, 1907), the term "straight jacket" appears. Of course this is a misprint of "straight track."

E. B. WILSON.

To Eliminate Petty Grievances.

New York, Jan. 28, 1908.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Noting your comment in last issue relative to inconvenience of a passenger on a New York Central train, would say that while the second section of your comment is somewhat of an improvement upon the first section, I think that, on the whole, you do not attach enough importance to the general theme of the weight of minor complaints of this sort in their effect upon public sentiment and influence. I think that such complaints as are referred to have had a very important influence in shaping adverse public sentiment concerning railroad matters—more so than some larger features, such as mergers, etc., that have attracted much more public attention. It seems to me, further, that the railroad papers, by advocating the elimination of these minor causes of complaint, might have put their patrons, the companies, in a much stronger position before the public.

I feel very sure that such minor difficulties as the unnamed correspondent refers to have had more influence in shaping public opinion than \$100,000 arguments by Joseph Choate on the sacredness of contracts, the right of corporations to a square deal and all other matters of that sort. In one case there is something definite before the private individual, a grievance that he communicates to his father-in-law, his mother-in-law and all his friends and relatives; in the other a mere generalization on an abstract subject which the average citizen only hears of through newspaper headlines.

I submit that you and other journalistic representatives of railroad interests can do good work for your patrons by urging the cutting out of petty annoyances.

F. W. SAWARD,

General Manager, *Coal Trade Journal*.

Keeping Passengers in Suspense.

New York, Jan. 20, 1908.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Men that go down to the sea in ships seem to be in a perilous and lonesome situation, and people take great pains to be considerate of their wishes. They are accorded special notice in holy writ, and the prayer book recognizes all kinds of people—good and bad—when they are in such a situation. In modern times, since we have come to rely more on our own ingenuity and less on prayers, the wireless telegraph has been invented for the benefit of men thus isolated, and unable to communicate with the rest of the world. A passenger on a suburban railroad train, however, is as bad off as he has ever been at any time since the world began; and his condition seems to be growing worse. On a train running out of New York not long ago a half dozen cars filled with passengers were kept standing for an hour at a point not far from a station, while the men got rid of some obstruction on the track; and the only way that any person on the train could find out whether the detention was to be 30 minutes or 30 hours was to go out in

the dark and, braving the dangers of the third rail and of being struck by lightning express trains on adjacent tracks, search for some unofficial and reckless employee who would take the risk of answering a civil question.

Of course, many ladies and other persons would prefer to remain in suspense rather than go in search of information under such conditions. One would naturally expect that after, say, 20 to 40 minutes, some brave spirit among the railroad men would find out what was the matter and spread the information in the cars. In this case, however, no such relief expedition came to us, and so the scores of passengers continued to sit decorously in their places, contented and ignorant. I was one of those who had an interesting story to read and, being in no particular hurry, have only a mild grievance. I am writing to you on behalf of those who had a more serious grievance but who did not know how to prosecute it. Why did not the telegraph and telephone stations within 500 to 1,000 ft. of that train impart some information to the passengers? Of course, they knew what the trouble was. They may have been utterly unable to predict the length of the delay, but, in such a case, passengers are glad to know that they are unable; to know that someone at least desires to measure the length of time which is going to be lost, even if he can't do it. Or, supposing the stationman or signalman is not fully informed, why should not the superintendent advise him at once? If the superintendent is not on duty (this was about 7 p.m.) why should not the train despatcher on duty be a man as big as a superintendent?

It would do no good for a state railroad commission to issue an order to regulate a matter like this, for improvement, if there is to be any, must depend on the railroad superintendent himself. A commission could say that passengers must be promptly informed; but the real issue hinges on what interpretation is put upon the word "prompt." Judging by the way relief trains are made up and sent to wrecks, it may often happen that to act in one hour is prompt. Surely a state commission, prescribing general rules, could not try to figure closer than one hour, but the railroad superintendent can do much better than this. On a road with block-signal stations every two or three miles communication ought to be had with headquarters from a delayed train usually in 20 minutes or even less.

A smaller but equally exasperating delay happened to me only last week. I boarded a train at the Grand Central Station, New York City, at 6.30 p.m. It started out on time and progressed beautifully for about one-eighth of a mile—that is to say, one-quarter of the distance through the yard; and then stopped. We were backed down into the station and stood there 30 minutes while the engine was repaired or changed. During that half hour we saw no relief expedition whatever; though the candy peddler, who had "worked" the train before it started, came back and renewed the attack. As in the former case, I had a book and so did not much care. I am writing now simply to let you know my poor opinion of the railroad. Here, again, although we were in a station, we were worse off, as before suggested, than if we had been 1,000 miles east of Nantucket lightship; for there Marconi would have helped us.

THERMOSTAT.

Chilled Iron Versus Steel Wheels.

107 Fenchurch St., London, E. C., Jan. 23, 1908.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article entitled "Comparative Physical Tests of Car Wheels and Tires," running through the present volume of your paper, has proved very interesting reading, but to my mind it seems that the chilled cast-iron wheel does not come in for its fair share of commendation; in fact, it appears to be brought in for adverse criticism only, whereas by noting the results carefully, and endeavoring to bring them in line with actual running conditions, the chilled iron wheel apparently shows itself for all practical purposes equal to the steel wheel for ordinary freight rolling stock, as in use in this country and the Colonies, and especially for narrow-gauge light stock of all type, and therefore to be recommended to all who are aiming at obtaining the best results at the least cost, owing to the great economy effected in the first cost of the cast-iron wheel against that of the steel wheel, provided, of course, that the chilled wheels are purchased from a manufacturer of reputed standing.

The cast-iron wheel tested on the short length of track, as mentioned in Chapter 2, is stated as having a depth of chill of about $\frac{5}{8}$ in., whereas a fracture of a 28-in. diameter wheel of Messrs. Miller & Co.'s (a Scotch firm) make now before me shows a chill extending over $\frac{13}{16}$ in. deep, which should therefore give even better results than the one tested.

Now, in the first chapter it is stated that "In the tests for both cast-iron wheel and steel wheel the permanent set was all in the rail. The rail * * * showed signs of a permanent set under a load of 20,000 lbs.," this seemingly applying both to the cast-iron and the steel wheel. Taking, for example, an ordinary 12-ton wagon, and assuming a tare of eight tons, this gives when fully loaded a

wheel load of 11,200 lbs., therefore with regard to the question of giving a permanent set to the rail no notice need be taken.

Again, on referring to the diagram on page 10, it is shown that the area of contact is practically the same for both cast-iron and steel wheels up to 22,500 lbs., although owing to the coefficients of slipping and skidding being slightly more for the steel wheel, a small advantage is on the side of the steel wheel, but hardly worth considering. Further, it is shown that the chilled iron wheel does not break or show signs of yielding until a load of 27,000 lbs. is applied, therefore this point need not be brought into very serious consideration, as the maximum weight per wheel would not approach within 50 per cent. of this under ordinary conditions.

In the test for wear, on a length of track it was shown that at three miles an hour the chilled iron wheel wore away at about $5\frac{1}{4}$ times faster than the steel wheel, while at 12 miles an hour the positions were practically reversed, owing, it is assumed, to the tires becoming heated. Granted this, the balance is all in favor of the chilled wheel, because the brake would ordinarily be applied when the speed of the truck averaged 10 or 12 miles an hour, and cause, according to the figures given, the steel wheel to wear at 4.6 times the rate of the chilled wheel, and this state of things should, without doubt, continue until the train was brought to rest, as when the speed had been reduced to three miles per hour, surely the tire would not get cooler?

The laboratory tests for abrasion are valuable so far as demonstrating the points of greatest density and hardness of the metals, but owing to the tests being made in a manner far from approaching ordinary running conditions, do not seem to be of much service in comparing chilled iron wheels against steel wheels. It would, however, be very interesting to know the result of the test for hardness on the Martel scale of the cast-iron wheel; surely one was made? But possibly this was suppressed owing to showing a superiority over the Schoen wheel.

In conclusion, may I be permitted to give a couple of extracts from a paper by Mr. W. E. Fowler, Master Car Builder, Canadian Pacific Railway, on the Chilled Iron Wheel? "The importance and value of the cast-iron wheel in railroad service lies unquestionably

in the wearing qualities of its tread or tire, the more than steely hardness of which gives more mileage for the same amount of wear (or metal removed), than any other wheel in existence. And not only does it stand up well under its present service conditions—that of carrying heavy loads over steel rails made as hard as they can be without danger of breaking, it also withstands with comparative freedom from failure the tremendous friction of the brake-shoes when making stops from a high speed, or when descending long heavy grades.

It is not uncommon in mountain districts to see the grease on the face of the wheels smoking from this cause, the wheels themselves being too hot to touch, and the brake-shoes red-hot, and it will be, I think, very difficult to produce materials of any other kind, which will give us wheels so serviceable, so economically manufactured, and so valuable when worn out, as the chilled cast-iron wheel."

And again: "The 600-lb. wheel costs about \$10.80 new, and after giving a mileage of 40,000 to 70,000, it is turned back to the foundry at a scrap value of about \$7.80, giving a cost per 1,000 miles of about 5 cents.

Can it be possible that this showing can ever be beaten with any other kind of wheel?

A. T. FERRIN,
Of Alexander Penney & Co.

The Bay Shore Cut-Off of the Southern Pacific.

The Bay Shore cut-off of the Southern Pacific out of San Francisco was opened December 8, notice of it being given in our issue of December 14. The construction work, which was very heavy, was described in the *Railroad Gazette* of March 15, 1907. This line forms a direct and easy entrance into the city for the Coast Line of the road, saving over $2\frac{1}{2}$ miles in distance, and as much as 30 minutes in time for some trains, as compared with the Ocean View line, which it supersedes. The latter climbs through the high ranges of hills on the south of the city and, in order to find workable grades, makes a considerable detour to westward. But even with this it has heavy helper grades of 158 ft. to the mile southbound and



Tunnel 2; Bay Shore Cut-Off.



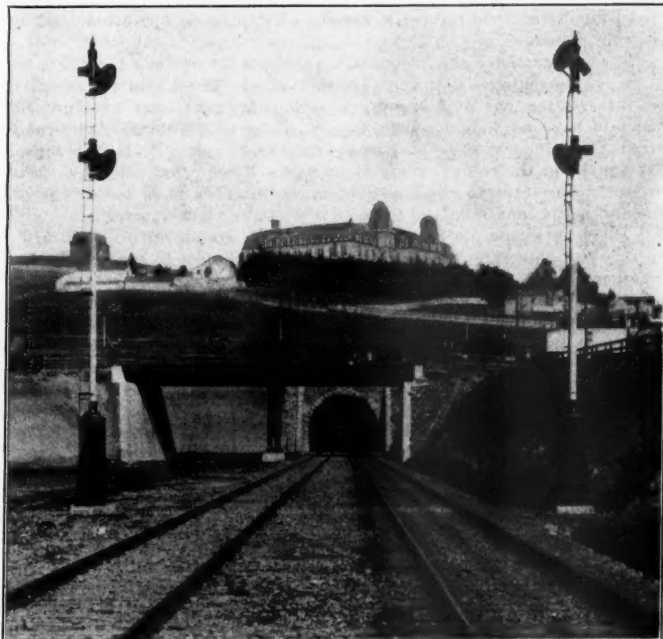
Track from Tunnel 4; Bay Shore Cut-Off.



Tunnel 5; Bay Shore Cut-Off.

a maximum elevation of 292 ft. above city base. The new line pierces the hills avoided by the other. Although only about 10 miles long it has almost two miles of tunnels, cuts with a maximum depth of 96 ft., and over 3,600 ft. of permanent creosoted timber trestle and steel bridges carrying the road over city streets. The maximum grade of the line is 15.84 ft. to the mile, and it is only 20.3 ft. above city base at its highest point.

We show herewith some interesting views of the finished line. The right-of-way and general design are for a four-track road, but only two tracks have been built.



Tunnel Under St. Joseph's Orphan Asylum.

Annual Report of the Interstate Commerce Commission.

The first part of the twenty-first annual report of the Interstate Commerce Commission, sent to Congress recently, was given in the *Railroad Gazette* of January 10. The present article deals with other portions for which there was not room in that issue.

Decisions of the Supreme Court.—Of the whole report, which fills 157 pages, about 25 pages are filled with court decisions relating to enforcement of the commission's orders, to injunctions to restrain proposed changes in rates, demurrage charges, free passes, the Schlemmer and other safety appliance cases, and many other subjects, all carefully classified and digested. On three decisions by the Supreme Court of the United States special comment is made, these decisions being regarded as peculiarly important in their bearing on the work of the Commission. The first is that in the Texas & Pacific cotton seed case (204 U. S. 426), in which the court held that the only remedy against the payment of an unreasonable interstate rate was to apply to the Interstate Commerce Commission. No suit at law can be brought in the courts until the Commission has acted. This seems to mean that any claim for damages based on alleged unjust rates must be taken before the Interstate Commerce Commission. In the Illinois Central case (206 U. S. 441) the court held that as a general proposition the reasonableness of rates was largely a question of fact which must be passed upon in the first instance by the Commission, whose findings of fact would not be lightly disturbed; for the Commission will have studied the conditions and have seen the witnesses. In the Atlantic Coast Line case (206 U. S. 1) a jury in North Carolina found that the public interest required the running of an additional train at a loss to the road of \$15 a day. The Supreme Court held that it was lawful for the state commission to compel such service. The court distinguished between a single rate and a schedule of rates; between a single train and an entire passenger service. The state must allow the road a reasonable return for its entire service, but still it may be justified in requiring a single train to be run at less than cost.

In the Illinois Central case referred to the court held that a railroad has no right to put its earnings into betterments and at the same time pay dividends, if the two appropriations together



Trestle Between Tunnels 3 and 4; Bay Shore Cut-Off.



Tracks and Tunnel 6; Bay Shore Cut-Off.

exceed a reasonable return on the value of the property. Improvements which are to increase the value of the property for many years must be paid for out of net income and not out of earnings.

Insufficient Railroad Facilities.—The report, written probably two months ago, speaks of the shortage of freight cars and the lack of track capacity and other things which have blocked freight traffic during the past year; but the only recommendation is that "all who believe in the full development of the country should give earnest thought" to the problem.

Tariffs.—An immense amount of work has been done in systematizing freight and passenger tariffs and condemning irregular and unlawful issues. Much is being done, but much remains to be done. In the year ending November 30, the Commission received 220,982 tariffs and about 400,000 notices of concurrence in tariffs. The task is declared to be by no means hopeless. The Commission believes that it is empowered by the law to modify the requirement that tariffs shall be posted in every station and proposes to issue an order allowing tariffs to be kept in the agent's office. He must keep those applicable at his station, and at one station on the road there must be a complete file of rates applicable from all stations. Every agent must have an index of this complete file. Agents must aid inquirers to interpret the tariffs, without asking them to give a reason for their inquiry.

Bills of Lading.—The Commission expects soon to prescribe a uniform bill of lading which will be acceptable to all the railroads.

Uniform Classification of Freight.—This is again mentioned and the Commission feels much satisfaction that the railroads are trying to carry out its wishes.

Opinions.—The principal decisions made by the Commission during the past year are given in an appendix, and the more important ones are summarized in the report itself. These deal with free transportation, party-rate tickets, violations of the anti-trust act, unreasonable rates, estimated weights, elevator charges, compression of cotton in transit, undue discrimination in rates and in facilities, and through routes and joint rates. The number of contested cases decided from the time the revised law took effect to November 11, 1907, was 107. In 46 cases orders were made against the defendants; in 46 the complaints were dismissed, and in 15 no orders were issued.

Rebating.—The Commission now has a "Division of Prosecutions" which has in charge investigations into criminal violations of the act to regulate commerce. This division prepares cases to be sent to the Department of Justice. Investigations made during the year show that rebating by payment of money or by billing at secret rates is now "far less" common than ever before, but preferences of a less tangible kind are still enjoyed by some shippers. These present practices are briefly described, including cases where a railroad buys property from a shipper at an exorbitant price, and even in some cases stipulating that the price of the property shall be determined by the number of shipments made.

Court Decisions.—A detailed résumé is given of court decisions since December 1, 1906, which have sustained the Interstate Commerce Commission law; such, for example, as that decision in the Standard Oil prosecution where a fine of \$29,240,000 was imposed.

Work Done.—During the past year the Commission has received 5,156 complaints, formal and informal, and has begun 415 formal investigations. The number of hearings held has been 276; more than three times as many as in former years. All departments of the work of the Commission in this direction show large increases. The aggregate amount of reparation awarded was \$104,700, and about 200 reparation claims were denied. These claims are so numerous that the work has been made a special department of the Division of Statistics and Accounts.

Block Signal and Train Control Board.—The work of this board was noticed in the *Railroad Gazette* of January 10. In connection with the work of this board, the Commission suggests that Congressmen who want to have the board take up and consider all sorts of so called safety devices should have the scope of the law enlarged to provide for this.*

Block System.—A chapter is given, as in former years, briefly summarizing the accident reports as published in the monthly bulletins for the periods up to June 30, 1907. The number of passengers killed in train accidents for the last four years has averaged 303 a year. As in former years, the board recommends a law to compel the establishment of the block system and to empower the Commission to investigate train accidents. This subject and the necessity of suspending proposed increases in railroad rates until their justice can be investigated are emphasized by the Commission as the two specially important matters of the report. On the block system bill the Commission says, in part:

The collision horror continues to be a crying evil. There has, indeed, been a steady increase in the use of the block system on the railroads of the country, but in the great activity in passenger travel of the past few years, which has been rapidly growing year by year, the passenger business of non-block-signalized lines has increased, with that of others, and many passengers have been killed in collisions. In the few serious collisions that have oc-

curred on block-signalized lines the management and discipline—in every case, with possibly one exception—have been shown to be glaringly faulty, demanding government investigation. This demand is urgent, as has been set forth in our previous reports.

So far as the Commission is aware, the only objections to this proposal are: (1) That the accident record and its death list grow because traffic is growing, there being apparently no new causes, nor any reason existing now which has not existed for many years, which would warrant legislative action; (2) that the principal railroads are gradually extending the use of the block system without compulsion, and that, therefore, a law would be an unnecessary governmental interference with private enterprise; (3) that governmental action is liable to be harmful because of the difficulty of dealing by statute with such a subject as block signaling, embracing, as it does, complicated and delicate machines, a variety of details in operation, and difficult scientific questions.

These arguments are adequately answered by obvious facts.

1. As percentages and averages in this matter contain very little instructive information, the first argument, as an argument, may be admitted. But it should have no weight unless we are ready to admit also that the evil referred to is incurable. Collisions continue to occur from the same causes that figured in the records forty years ago. Some of our railroads have taken successful measures to remove those causes; others have not. The principal remedial action has been the introduction of the block system.

2. The principal railroads have the block system in use, and are extending it. But this extension is irregular and is subject to hindrances, and some prominent roads are extending it too slowly or not at all. A regulative and compulsory law is necessary to insure regular and uninterrupted progress. Errors of judgment on the part of railroad managers and engineers, or disagreements between such officers and their superiors, who, not well informed, refuse appropriations for signal improvements, have in well-known instances proved decided obstacles to progress, and disastrous collisions have followed such procrastination.

3. The measure recommended by the Commission would not deal with the details of block signaling. As in the case of the safety-appliance laws, it would simply require, in substance, that the railroads as a whole shall make progress in a direction in which the most intelligently managed roads are already making progress. The Congress would do a great service if it were only to compel the laggards to keep abreast of the standards of progress set by the best managed lines. The principal thing proposed, aside from the main requirement, is the provision for governmental supervision. Again making comparison with the safety-appliance law, the situation as regards block signals is like that which the law of 1893 encountered in the case of automatic car couplers—a fair degree of uniformity (on the best roads) in the fundamental feature, but great diversity in details.

These details are not unimportant, however. Probably it is not a proper function of the Government to rigidly regulate or prescribe them; but it is important that they be given more publicity, and the Federal Government is the only authority which can bring about such publicity. In its two main provisions—(1) for a very liberal and unconditional requirement that the block system be used, and (2) for investigation, inspection, and supervision of block-signal practice—the proposed measure is the same as that which was passed in Great Britain over seventeen years ago and which has produced such highly satisfactory results in that country. In a sense, supervision of block signaling has greater possibilities for good, as a governmental function, than has investigation of accidents; for it looks toward prevention of a certain class of accidents without waiting for the object lesson of an actual disaster.

It will perhaps be fair and just to require the railroads to adopt the block system in a shorter period of time than has been heretofore suggested. Some roads have made nearly or quite as rapid progress in the introduction of block signals as would probably have been required by law. It is believed, therefore, that no injustice will be done if railroads, or parts of railroads, having passenger receipts of \$1,500 per mile per annum, are required to be brought under the block system in two years. Railroads having total receipts from all traffic of \$3,000 per mile per annum should be subject to the same requirement.

Laws looking to the compulsory establishment of the block system are now in force in Massachusetts, Minnesota and Indiana, and the revised public-service law of New York gives plenary powers in this matter to the public-service commission of that State. There is as yet no indication that there will be any conflict between State and Federal laws on this subject; but as any law which the Congress, pursuant to the constitutional provision, may pass concerning interstate railroads will, without doubt, prevail as against any conflicting State statute, it is desirable that action be taken by the Congress without delay and before the state legislatures shall go further.

Investigation of Accidents.—The investigation of collisions, derailments, and other serious accidents on railroads by competent experts is a matter deserving the careful attention of the Congress. A recommendation to authorize such investigation has been made in previous reports, and the same recommendation is now again made. The daily and technical press have both endorsed the recommendations which have been made by this Commission. The causes of railroad accidents are often complicated and obscure and a cross-examination and sifting of evidence is necessary in nearly every important case in order to bring out the truth and to rightly apportion the blame. Unlike some of the questions connected with the subject of rates, or other matters not affecting the safety of lives or the security of property, this subject of accident investigation (as well as that of block signaling) is one on which there is no doubt as to public policy. All persons are agreed that the lives of passengers on railroads should be better safeguarded, and there is little, if any, dispute as to the direction which any government activity should take.

As has been pointed out in previous reports, all railroad accidents should be reported to the Commission monthly, relieving the railroads' annual reports of this feature. To provide for this and as a definite embodiment of the recommendation for investigation a tentative draft of a bill is given in the Appendix.

Terra Cotta Collision.—In this chapter the Commission makes its first report on the collision at Terra Cotta, D. C., December 30,

*Senator Crane, of Massachusetts, on Jan. 9, introduced a resolution looking to the enlargement of the functions of the board.

1906, when 43 persons were killed. Acting under the Congressional resolution authorizing the Commission to investigate the subject of block signaling, a special inquiry was made into this accident. The report now embodied in the annual report is brief and apparently not intended as an exhaustive study or a formal decision. It says:

An extra train of empty passenger cars struck a regular train heavily loaded with passengers upon a division of road which was equipped with block-signal system, of manual control. Several intelligent and credible eye-witnesses testified that red signal was displayed against this extra train at a block-signal station passed by it shortly before the collision occurred; that the signal was disregarded, and that train proceeded at a high rate of speed. This was corroborated by telegraph operators who heard the operator in charge of that signal immediately report by wire the fact that this train had run by his red signal. The men who were employed on this train testified that if a red signal was there they did not see it. The testimony was conflicting and contradictory between the men on the train and those at the station as to the character of the signal displayed when this extra train passed the block signal station next preceding the one at which it was alleged the danger signal was disregarded.

Inquiry was made as to the care with which employees in charge of trains and engines and of block-signal stations were selected, and as to the thoroughness with which their fitness for the positions was tested and determined. Many young and rather inexperienced men are employed as block-signal operators, but it was not shown that neglect or lack of experience on their part contributed to this disaster.

If the preponderance of evidence as to the condition of the signal at the last signal station passed by this train before the wreck occurred is accepted, the men in charge of that extra train are thereby convicted of having run by a danger and positive stop signal. On the other hand, if their own testimony as to the condition of the signal at the last signal station but one which they passed before the wreck occurred is accepted, they are thereby convicted of having entered the block under a caution signal, which, under the rules of the company, required that they run through the block with extreme care and with train under full control, and of having run through that block at a high and dangerous rate of speed, especially in view of the fact that at the time a dense fog prevailed; which fact, under the rules, would require extraordinary care and caution. Many references were made to incidents or instances of more or less important infractions of rules by employees and of absence of rigorous discipline by the company. This wreck was caused by disregard of rules and signals upon part of the men in charge of the extra train. Inquiry did not disclose act or omission on part of other employees or defect in the operating rules of the company which contributed to this awful occurrence. These men took charge of this train at noon and the collision occurred about 7 o'clock in the evening.

Concerning the collision at Lawyer, Va., where President Spencer was killed, the Commission made no investigation, but embodies in the report the conclusions published by the Virginia State Corporation Commission. These were given in the *Railroad Gazette* of May 24, 1907.

Safety Appliances.—From reports made to the Commission by its inspectors of safety appliances, the general condition of cars appears to be much better than it was a year ago. Somewhat fewer cars were inspected during the last year, the number being 271,617 for 1906, and 242,881 for 1907. Calls upon inspectors to investigate complaints of violation of the law were more numerous and they were also engaged more frequently as witnesses in court. For each 1,000 cars inspected in 1906 there were 139.34 defects; in 1907 there were but 94.14.

By an act of the last Congress the Commission's inspectors are required to examine mail cars and to report upon their construction, adaptability, design and condition. Since July 1, 1907, 70 postal cars have been inspected. Copies of reports of these inspections have been transmitted to the Postmaster-General, in compliance with the terms of the law.

Rigid enforcement of the interchange agreement, adopted as a result of conference between the Commission and the railroads, is largely responsible for the improved condition of equipment. The fact that cars cannot be delivered to nor received from connecting lines with defective safety appliances has practically resulted in double inspection. Cars are inspected upon arrival at a terminal or interchange point and again before delivery to a connecting line. This system works admirably and gives satisfaction wherever it is enforced. The roads most rigid in observing the interchange agreement are the ones upon which cars are found in the best condition.

Considerable increase in the number of men employed by railroads in repair work has been made at some points, but there are still places where more men could be employed to advantage. Difficulty in securing competent men has caused disabled cars to accumulate, and bad-order cars have been moved long distances to points where repairs could be conveniently made. As a result many complaints have been made concerning the movement of cars without drawbars and attached to one another by means of chains. This practice is extremely dangerous and the Commission has made every effort to put a stop to it.

The courts have decided that carriers must have men and material necessary to make safety-appliance repairs wherever there is likelihood of defects occurring, and to haul a disabled car past a repair point because it is more convenient to have repairs made at some point farther on is a violation of the law. A decision to

this effect was made by Judge McPherson in a case against the Chicago, Milwaukee & St. Paul, November 27, 1906 (149 Fed. Rep., 486). This case has been taken to the Circuit Court of Appeals by the railroad company; argument has been had and the case submitted. A decision holding the movement of chained-up cars unlawful was also made by Judge McCall on June 11, 1907 (154 Fed. Rep., 516).

In nearly all train yards of importance men are now specially employed for the purpose of looking after the condition of safety appliances. These men have become trained in their work and more readily detect defects than the ordinary inspectors who have other duties to attend to. The employment of traveling inspectors by railroads has also done much to improve conditions. These inspectors educate repairmen.

The number of cars equipped with air-brakes has greatly increased, due largely to the order of the Commission increasing the percentage of air-brakes to be used in trains on and after August 1, 1906, and also to a rule of the Master Car Builders' Association requiring all cars delivered in interchange to be equipped with air-brakes. This rule went into effect September 1, 1907, but it was anticipated for some months previous to that date by practically all the large roads in the country, which refused to receive cars from their connections unless they were equipped with air-brakes. While this increase in the number of air-brakes used is gratifying, it must be noted that the maintenance of air-brake equipment has not been up to the standard. Insufficient attention is paid to the matter of piston travel, train pipe leakage, and the proper cleaning and oiling of triples.

Comparatively few train yards are equipped with testing plants, and cars are often permitted to leave terminals without a proper brake test. This results in many defective cars being hauled in trains and a consequent decrease in braking power. * * * Complaints are numerous concerning the bad condition of hand brakes. * * * Many employees have suffered serious injury in gravity yards because of defective hand-brakes, and to this cause may be attributed much of the damage to cars and their contents which is commonly laid to rough usage or carelessness in switching.

The safety-appliance law should be amended so as to cover all appliances included in the Master Car Builders' standards for the protection of trainmen; sill steps, ladders, roof hand holds and running boards. These appliances are necessary for the safety of employees, and it is important that they be kept in first class condition. There should also be an amendment to the law requiring the use of automatic air and steam hose couplers. Men are subjected to danger by going between the cars to couple and uncouple hose. Many casualties are due to this cause and as automatic appliances for the connection of steam and air hose are no longer an experiment, it is believed that their use may properly be enforced by law.

In general, carriers have shown a disposition to comply with the law and have co-operated with the Commission to secure its proper enforcement. The Commission has endeavored to secure the ends of the statute without prosecution wherever possible. Since our last report 171 cases, involving 716 separate violations of the statute, have been filed in court. In 29 cases, involving 117 violations, verdicts have been rendered for the Government; in four cases, involving 28 violations, there have been verdicts for the defendant. Two cases have been dismissed by the Government on account of technical error in complaint. The four cases in which verdicts in favor of defendant were rendered have been appealed.

Since the last report of the Commission, the important case of *Schlemmer v. Buffalo, Rochester & Pittsburg Railroad Company* (205 U. S., 1) has been decided by the Supreme Court of the United States [*Railroad Gazette*, March 15, 1907]. * * * In one count of a case against the Missouri Pacific, decided by Judge Munger, Nebraska, October 5, 1907, involving the height of drawbars, a verdict was rendered for the road, the court holding that the language of the regulation is indefinite in that the 3 in. variation from the standard height of 34½ in. might apply either way. * * * Up to date judgments to the amount of \$45,000 have been had against carriers for violation of the statute. In a total of 282 violations involving fines amounting to \$28,200, the repairs necessary would have cost but \$68.03.

The question of the safe handling of trains on heavy grades has been brought to the attention of the Commission, it being contended that a literal interpretation of the law requires that trains shall be handled exclusively by means of air-brakes under all circumstances and conditions of train operation. The object and intent of the law is to save life. If trains cannot be handled upon these heavy grades without the use of hand-brakes it is certainly not the intent of the law to require that they be controlled by air alone. The Commission has examined the practices in handling trains on heavy grades in all parts of the country. A report concerning this matter is now being prepared and will be published later.

Medals of Honor.—By an act of Congress of February 23, 1905, the President of the United States is authorized to bestow bronze

medals of honor on persons who by extreme daring, endanger their own lives in saving, or endeavoring to save, lives from any wreck, disaster, or grave accident upon railroads engaged in interstate commerce. Up to date 17 applications for medals under this law have been received by the Commission. Seven of these applications

Car Surpluses and Shortages, Jan. 22.

The following table, from the current Bulletin of the American Railway Association's Committee on Car Efficiency, summarizes the situation of Jan. 22, in comparison with previous periods, as follows:

Date.	No. of roads.	Surpluses.			Shortages.			Total.		
		Box.	Flat.	Coal gondola and hopper.	Other kinds.	Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.
Jan. 22, 1908.....	153	123,226	26,788	140,928	48,111	392	132	79	135	738
Jan. 8, 1908.....	160	149,624	23,059	127,126	41,874	457	34	42	120	653
Dec. 24, 1907.....	158	87,714	14,740	62,150	42,276	187	81	191	265	724
Dec. 11, 1907.....	153	48,977	9,888	27,462	33,012	2,506	420	746	848	4,520
Nov. 27, 1907.....	160	46,246	3,645	10,028	10,429	11,908	868	2,964	2,224	17,964
Nov. 13, 1907.....	164	4,103	1,208	2,365	4,525	37,473	3,006	10,914	5,550	57,903
Oct. 30, 1907.....	161	786	600	1,285	1,275	61,592	3,546	15,987	9,632	90,757

were not supported by sufficient evidence and could not be acted upon. In the 10 other cases, eight applications have been approved and medals awarded; two applications have been rejected. The names of persons to whom medals have been awarded will appear in an appendix to this report.

Uniform Railroad Accounts.—The report summarizes what has been done during the past year in prescribing methods of railroad bookkeeping. Before the beginning of the next fiscal year, July 1, 1908, rules will be prescribed for the financial accounts of railroads. Congress is again asked to authorize an official valuation of the property of all the railroads of the country, and the reasons for recommending this are given. The government is going to require the railroads to keep depreciation accounts, as being an essential feature of any system which is to show the true cost of maintenance, and a valuation is declared to be necessary as preliminary to this. Fifteen states have already provided for a more or less complete valuation of railroad properties.

Having prescribed bookkeeping rules for the railroads, the Commission now requires the person at the head of the accounting department to take the responsibility of seeing that the law is obeyed—that is, to see that the accounts are kept according to the prescribed rules.

State railroad commissions are uniformly in favor of doing everything possible to make their accounting forms uniform with those of the Federal Commission. This is especially desirable in connection with electric roads, for not more than one-fifth of such lines come within the jurisdiction of the Federal Commission. The National Association of Railway Commissioners has requested the Interstate Commerce Commission to establish a bureau of correspondence for the purpose of unifying statistical practice throughout all the Commissions, and this will be done.

The Commission proposes to establish a large board of special examiners to keep track of the accounts of all the railroads throughout the country.

Preliminary Statistics to June 30, 1907.—For the last fiscal year ending June 30, 1907, returns have been received for 894 railroad companies, representing an operated mileage of 225,584.30 miles, or, presumably, more than 99 per cent. of the mileage that will be covered by the final report.

This advanced report shows that the gross earnings of the roads it covers for the year 1907 were \$2,585,913,002; passenger service, \$683,980,921, or 26.45 per cent.; freight service, \$1,826,209,111, or 70.62 per cent., and miscellaneous earnings, \$75,722,970, or 2.93 per cent. The gross earnings averaged \$11,463 per mile. This average exceeds the like average for any prior year since the Commission was organized. The gross earnings the year before averaged \$10,460. The operating expenses of the roads covered by the 1907 preliminary report were \$1,746,097,122, equivalent to \$7,740 per mile. Net earnings were \$839,815,880, or \$3,723 per mile, and the net earnings for the corresponding roads for the year 1906 were \$787,420,827.

The total income of the operating roads covered by the preliminary report was \$997,350,465. There was charged against this amount for interest, rents, betterments, taxes and miscellaneous items the sum of \$605,916,745, and also as dividends the sum of \$259,233,580, leaving a surplus for the year of \$132,200,140. The amount of taxes charged to income during the year was \$73,617,082. Since the preliminary report pertains to operating roads only, it does not include any dividends paid by leased lines from the income which they received as rent. It may be said, however, that the dividends declared by subsidiary leased lines for the preceding year ending June 30, 1906, amounted to about \$43,000,000.

The report also gives an abstract of the final report of the statistics for the year ending June 30, 1906. These statistics were reported in the *Railroad Gazette*, September, 20, 1907.

The Maffei Locomotive Works of Munich has delivered to the Baden State Railroad an express locomotive described as of the "Pacific" type, with frame of American design, which has made satisfactory trial trips with 13 eight-wheeled cars, and speeds reaching 68 miles per hour.

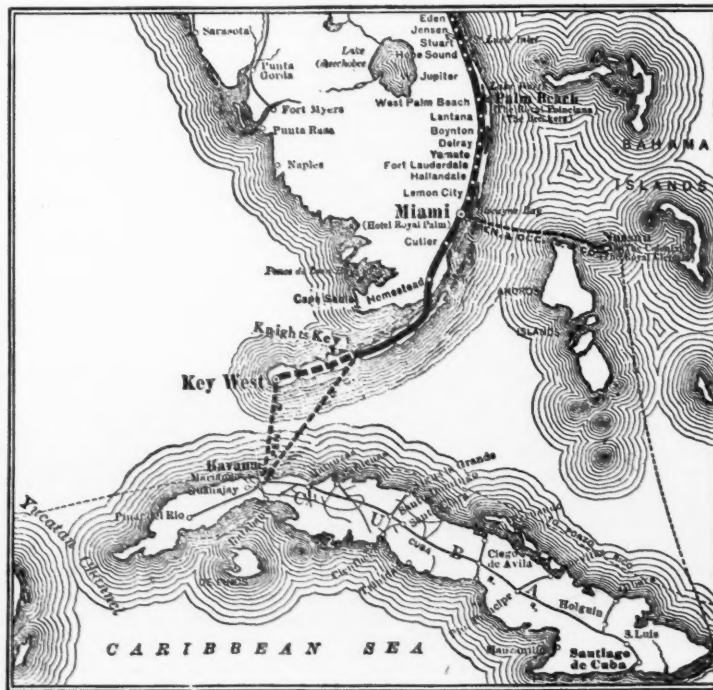
From Oct. 30 we see the conditions changing with each fortnightly report until on Jan. 8, 1908, there is a total of 341,683 idle cars of all classes on 160 roads, and on Jan. 22, 339,053 surplus on 153 roads. The figures for Jan. 22, while representing fewer roads than previous reports, include all the larger roads and are fairly comparable with figures for earlier dates.

While the most severe effects, as indicated by the surplus figures, were felt in the eastern and middle states, comprising roads, a large proportion of whose business is iron, steel and coal, it is notable that the earliest indications of surplus are in the north-western states, which on Nov. 13 reported a large net surplus of box cars, while other groups still reported large shortages of all classes of equipment. On Nov. 27 the grand total surpluses exceeded the shortages, not only in the total cars, but also by classes. The surplus was still heaviest in the northwest, while the Eastern, North Atlantic, Southern, Pacific and Canadian roads still reported more shortages than surpluses of box cars. Coal and gondola cars had, however, begun to grow plentiful in the eastern and middle states, and by Dec. 11 there was a large surplus of cars in these classes.

The Canadian roads reported gradually diminishing shortages and increasing surpluses until Dec. 24, when the conditions quite suddenly became aggravated, and the reports for that and subsequent dates denote conditions similar to those existing in the United States. From the reports for Jan. 22 an improvement in the box car situation seems quite general, while the western roads have also reduced their accumulation of gondola and coal cars. These latter classes, however, still show large surpluses in the east, which will be gradually reduced if there is an improvement in the general business situation. What effect the unusual conditions of the past few weeks have had on the general car performance can only be estimated until such time as complete statistics covering this period are available. There is little doubt, however, that one of the results which will be shown is an enormous increase in empty car mileage, a large proportion of which would seem to have been unnecessary.

The Florida East Coast Extension.

The extension of the Florida East Coast Railway southwest along the Florida Keys to Key West has often been described in the *Railroad Gazette*. Articles describing the nature of the work



The Florida East Coast Extension.

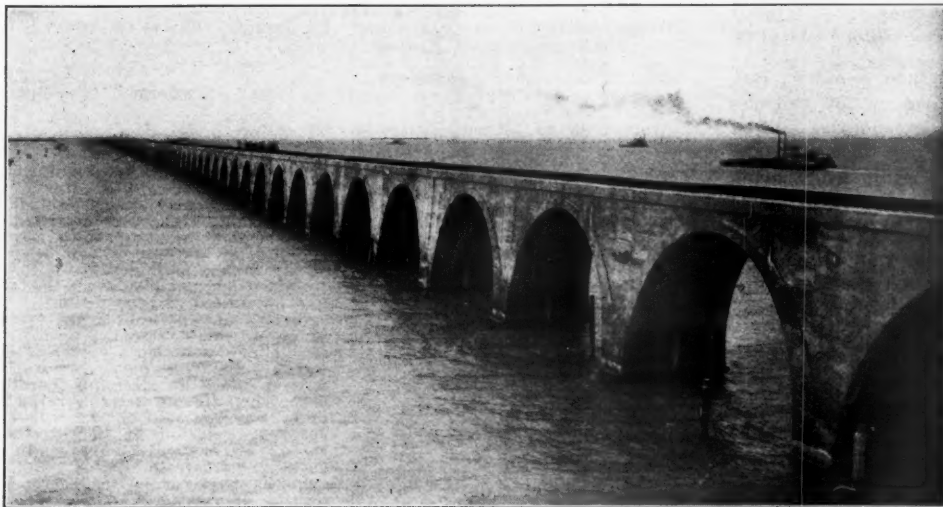
or the progress made were published on Oct. 6, 1905; April 20, 1906; April 26, 1907; Aug. 30, 1907, and Oct. 11, 1907.

About the middle of January, track was laid on the extension as far as Knight's Key, 109 miles south of Miami and 47 miles short of the eventual terminus at Key West. On Feb. 5 the first

Cuba is only about one-tenth under cultivation and there are great possibilities for profitable investment there which would be likely to be taken up if brought directly to the attention of Americans. On the other hand, a large proportion of even the wealthy Cubans have never left the island because of the dread of seasickness. A route which requires only five or six hours water trip is likely to attract many of these. One great advantage of the extension will be that deep draft vessels can be used between Florida and Cuba. Previously only light draft vessels could be used on account of the shallow water in Miami harbor.

The Florida East Coast Railway is the personal property of Henry M. Flagler, of the Standard Oil group of capitalists, and the extension is his personal enterprise. Every share of stock and every bond of the company is owned by Mr. Flagler, except \$3,500,000 three-year 6 per cent. notes dated August 1, 1907, secured by all the outstanding first mortgage bonds of the Florida East Coast and also by the personal endorsement of Mr. Flagler, which were issued to provide funds for the construction work.

One of the results of the building of the Siberian Railroad has been the establishment of 2,200 creameries in Siberia. A large part



The Ocean Viaduct. Trains in Crossing It Go out of Sight of Land.

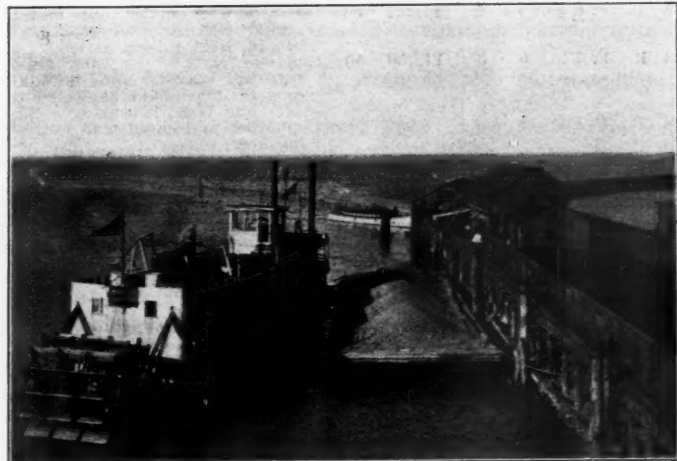
train for which tickets were sold was run and on Feb. 6 regular passenger service was begun, with through connection to Cuba by a new steamer service from Knight's Key to Havana, 115 miles away, the Havana service of the Peninsula & Occidental Steamship Company from Miami being at the same time abandoned. Passengers leaving Miami at 11 a.m. are due to reach Knight's Key at 4 p.m. and Havana at 6.30 a.m. the next day.

The remaining 47 miles to Key West of the extension are to be finished within a year. Key West is only 90 miles from Havana, and it is planned eventually to connect the two points by a car-ferry service which will take trains straight through, making direct connection with the standard gage railroad system of Cuba. The accompanying photographs show typical scenes along the line of the extension and the temporary terminal at Knight's Key, from which the boats for Havana start. The longest of the viaducts on the whole extension is from Long Key to Grassy Key, 5½ miles over the bed of the ocean. This is on the road already in operation. The rails are carried 31 ft. above the mean surface level of the water on a reinforced concrete viaduct. On this viaduct trains go out of sight of land. The accompanying map shows the route of the extension, the steamer connection from Knight's Key to Havana, and the proposed car-ferry connection from Key West to Havana.

It is expected that the completed route will get a large part of the passenger, express and light freight traffic between Cuba and the United States, besides a certain share in through freight traffic. Florida tourists in particular will be likely to take a trip to Cuba.



Cocoanut Palms Along the Beach of One of the Keys.



Temporary Terminal at Knight's Key for Havana Steamers.



Work Train on Ocean Viaduct.

of the butter made in them is exported to Germany and western Europe. Regular dairy trains with refrigerator cars carry this butter to Baltic ports, distant 1,830 to 2,550 miles. The number of creameries and the quantities of butter exported increase constantly. In the four months to July 31 over 44,000,000 lbs. were shipped.

Accident Bulletin No. 25.

The Interstate Commerce Commission has issued Accident Bulletin No. 25, giving a summary, in the usual form, of the railroad accidents in the United States during the three months ending September 30, 1907. The number of persons killed in train accidents was 346, and of injured, 4,990. Accidents of other kinds bring the total number of casualties up to 23,063 (1,339 killed and 21,724 injured). These reports deal only with (a) passengers and (b) employees on duty.

TABLE No. 1.—Casualties to Persons.*†

	Passen- gers		Em- ployees		Tot'l persons reported	
	Kil'd.	Inj'd.	Kil'd.	Inj'd.	Kil'd.	Inj'd.
Collisions	77	1,563	119	1,182	196	2,745
Derailments	33	1,076	80	713	113	1,789
Miscellaneous train accidents .....	..	24	37	432	37	456
Total train accidents	110	2,663	236	2,327	346	4,990
Coupling or uncoupling .....	..	..	87	986	87	986
Other work about trains or switches .....	..	..	81	4,910	81	4,910
In contact with bridges, structures, etc.	2	18	37	424	39	442
Falling from or getting on cars or engs.	60	672	227	3,534	287	4,206
Other causes	23	872	476	5,318	499	6,190
Total, other than train accidents	85	1,562	908	15,172	993	16,734
Total all classes	195	4,225	1,144	17,499	1,339	21,724

*In Table No. 1 "passengers" includes passengers traveling on freight trains, postal clerks, and express messengers, employees on Pullman cars, newsboys, live-stock tenders, and men in charge of freight.

†Accidents to employees resulting in slight injuries which do not prevent the employee injured from performing his accustomed service for more than three days in the aggregate during the ten days immediately following the accident are not reported.

That the enormous activity in traffic, which has been a factor in the explanation of previous bulletins, was still undiminished in the period here reported on, is indicated by the marked increase in casualties to passengers from causes not connected with train accidents (85 now, 58 a year before); for this item undoubtedly contains a proportion, larger than others in the table, of accidents which, from the railroad standpoint, are to be classed as unavoidable, and therefore in the long run showing totals more directly proportionate to the number of persons traveling.

Increases are shown in the other principal items (see Table 1a below), except item No. 1; but in this connection it is to be borne in mind that Bulletin No. 24 represents a quarter in which the volume of traffic, and consequently the number of casualties, usually is lighter than in either of the other quarters of the year.

As to item No. 1—passengers killed in train accidents—a black record is again presented. Three collisions (Nos. 26, 27 and 30, in Table 2a) and one derailment being responsible for 80 deaths in this class, an average of 20 passengers to each of the four accidents. Particulars of these and other notable collisions and derailments are given, following Table 2a.

TABLE No. 1a.—Comparison of Principal Items with Last Bulletin and with One Year Back.

	Bulletins		
	No. 25.	No. 24.	No. 21.
1. Passengers killed in train accidents	110	48	52
2. Passengers killed, all causes	195	111	110
3. Employees killed in train accidents	236	202	215
4. Employees killed in coupling	87	72	81
5. Employees killed, all causes	1,144	954	1,072
6. Total passengers and employees killed, all causes	1,339	1,065	1,182

The total number of collisions and derailments in the quarter now under review was 4,279 as below:

TABLE No. 2.—Collisions and Derailments.

[NOTE.—Collisions and derailments which cause no death or personal injury and which cause not over \$150 damage to the property of the railroad are not reported.]

	Persons		Persons	
	No.	Loss.	Killed.	Injured.
Collisions, rear	508	\$524,607	31	605
" butting	277	570,473	124	1,229
" trains separating	128	52,848	..	68
" miscellaneous	1,332	617,613	41	843
Total	2,245	\$1,765,541	196	2,745
Derailments due to:				
Defects of roadway, etc.	411	\$417,761	17	601
Defects of equipment	865	627,287	16	297
Negligence, train or signalmen, etc.	141	119,574	17	176
Unforeseen obstruction of track, etc.	87	135,020	12	122
Malicious obstruction of track, etc.	24	64,061	7	65
Miscellaneous causes	506	476,452	44	528
Total	2,034	\$1,840,155	113	1,789
Total collisions and derailments	4,279	\$3,605,696	309	4,534

Following is the usual list of Class A train accidents—all in which the damage is reported at \$10,000 or over; notable cases in which passengers are killed, and those doing damage less than

\$10,000 and down to \$2,000, wherever the circumstances or the cause may be of particular interest:

TABLE 2a.—Causes of Forty-Nine Prominent Train Accidents (Class A).

[NOTE.—R, stands for rear collision; B, butting collision; M, miscellaneous collisions; D, derailment; P, passenger train; F, freight and miscellaneous trains.]

No.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars & roadway.	Reference to record.	Cause.
1	R.	F. & F.	0	0	\$2,300	83	Engineman on duty 17 hrs., and asleep, passed automatic block signal set against him; also passed flagman.
2	B.	P. & F.	0	23	2,600	12	Freight train wrongfully admitted to block section; struck passenger train standing at station; in freight, part of air brakes had been cut off, but trainmen had not discovered the fact; had not tested at proper time.
3	R.	F. & F.	0	3	3,252	98	Engineman asleep; approached station at uncontrollable speed, 2 a. m.
4	M.	P. & F.	0	4	3,900	4	Error in dispatcher's order; two words, including name of station, written twice by receiving operator; dispatcher did not detect error when order was repeated.
5	B.	F. & F.	5	6	4,300	85	Approached station at uncontrollable speed; victims were employees in caboose of work train.
6	B.	P. & F.	8	32	4,600	7	Engine in charge of hostler, encroached on time of passenger train; 8 passengers killed; hostler had been misinformed as to lateness of passenger train by operator, who had misread an order.
7	R.	F. & F.	0	0	4,800	2	Failure of air brakes, angle cock having been shut between first and second engines of "double-header." Angle-cock lever had been moved by cylinder-cock rod pressing against it.
8	R.	F. & F.	0	0	5,000	101	False clear telegraph block signal.
9	B.	F. & F.	0	1	5,550	52	Dispatcher's order copied incorrectly (1,384 for 1,382); was repeated correctly.
10	M.	F. & F.	2	8	6,500	54	Freight waiting on side track, 2 a. m.; men failed to see green signals carried by passing train; signals dim; train on side track 50 ft. from main track; not seen by men on passing train and whistle signal consequently not given.
11	B.	F. & F.	0	6	7,460	14	Careless management of block signals and failure to deliver meeting order; responsible operators had had only five months' experience.
12	B.	P. & P.	1	11	7,700	99	Engineman forgot meeting point (Sunday schedule), though he had been cautioned by conductor at beginning of trip; engineman killed.
13	R.	F. & F.	0	2	7,704	88	Engineman, on duty 17 hrs. in last 19 hrs., fell asleep and passed automatic block signal set against him; also passed flagman.
14	B.	P. & P.	1	7	8,200	10	Dispatcher completed meeting order to inferior train before properly placing order for superior train.
15	B.	F. & F.	1	2	9,300	58	Failure to deliver meeting order; operator, without leave, had put substitute in his place for 30 minutes and had not properly informed substitute about the order.
16	R.	P. & F.	1	2	10,000	91	Freight train, 1 a. m., unexpectedly stopped; was not protected by flagman.
17	B.	F. & F.	4	4	10,185	51	Conductor and engineman of extra freight overlooked schedule of regular train.
18	M.	F. & F.	1	2	11,350	92	Cars escaped from yard and ran on main track; had been left unsecured by negligent switchmen.
19	B.	P. & F.	3	53	11,433	17	Freight train ran over misplaced switch and through crossover track into passenger train.
20	M.	F. & F.	0	0	12,963	8	Collision at crossover; train approached station at uncontrollable speed.
21	R.	F. & F.	0	2	13,710	18	Runaway on 3 per cent. grade; carelessness in starting from side track on grade, three trainmen being on the ground instead of at their posts on the cars or engine.
22	B.	F. & F.	4	5	14,261	86	Operator (in service one month) accepted meeting order after train had passed, having been asleep.
23	R.	F. & F.	0	5	14,350	40	Runaway on 1½ per cent. grade; insufficient brake power; in taking on cars trainmen had neglected to connect and test air-brakes.
24	B.	P. & F.	3	27	15,000	59	Conductor and engineman forgot meeting order.
25	M.	P. & P.	0	36	16,000	95	Approach station at uncontrollable speed. (See text below.)
26	B.	P. & F.	10	32	16,496	87	Operator turned eastbound passenger train to wrong diverging track; six passengers killed. (See text below.)
27	B.	P. & F.	20	105	17,785	6	Conductor and engineman of freight misread dispatcher's order. (See text below.)
28	B.	F. & F.	0	2	18,558	97	Meeting order not delivered. (See text below.)
29	B.	F. & F.	1	7	24,600	3	Freight ran past appointed meeting station.
30	B.	P. & F.	26	33	25,000	89	Mistake in dispatcher's order. (See text below.)
31	B.	P. & P.	4	4	40,000	57	Meeting order not delivered. (See text below.)
Total	105	424	105	424	\$354,857		

DERAILMENTS.

1	D.	P.	5	13	\$1,125	122	Failure of 100-lb. rail, 9 years old;
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No.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars & roadway.	Reference to record.	Cause.
2	D.	P.	0	0	5,448	35	cracked between ball and web; four passengers killed.
3	D.	P.	3	8	7,300	29	Interlocked switch thrown under moving train, detector bar having failed; bar 1/2-in. thick, 2 1/2 inches wide, was supported by "motion-plate" clips.
4	D.	P.	1	8	8,223	79	Cause unexplained; engine running tender first. Two passengers killed.
5	D.	F.	3	0	9,370	112	Excessive speed on 10-degree curve. Runaway on steep grade; air pump had stopped; engineman (killed) was capable and experienced.
6	D.	F.	0	0	10,176	111	Spreading of rails.
7	D.	P.	0	9	10,450	75	Track distorted by solar heat; track inspected one hour before.
8	D.	P.	14	19	13,700	116	Unexplained. (See text below.)
9	D.	F.	0	0	14,660	78	Runaway of 38 freight cars; had been left on side track without being secured by handbrakes; cars ran 27 miles and were then sidetracked by telegraphic order, and were wrecked.
10	D.	P.	0	31	16,000	82	Unexplained.
11	D.	P.	0	18	18,200	24	Misplaced switch.
12	D.	P.	5	27	18,800	81	Passenger train wrecked by running into parts of cars which had fallen upon its track in consequence of derailment of freight train on adjoining track, caused by broken flange.
13	D.	P.	0	9	23,000	63	Ran into hand car left on track by careless repairmen.
14	D.	F.	3	5	25,100	106	Runaway on steep grade; bad management of air-brakes.
15	D.	F.	0	0	32,200	62	Runaway of freight cars left standing on grade without hand-brakes being set.
16	D.	P.	0	25	45,100	120	Rail turned over, tie plates having been broken; rail, when no weight rested on it, stood in perfect position, though probably it had been loose some little time; track walker had just inspected the line.
17	D.	P.	2	13	56,000	124	Breakage of flange, wheel of tender.
18	D.	P.	0	32	63,000	114	Broken rail; train running 50 miles an hour on straight line; rail, 12 years old, had interior defect; greater part of loss due to fire from explosion of gas tank of sleeping car.
Total.....			36	217	\$377,852		
Grand total.....			141	641	\$732,709		

Collision No. 27 was between a westbound local freight train and an eastbound passenger excursion train of 11 cars. Twenty-eight passengers and two trainmen were killed and 102 passengers and three trainmen were injured. The freight train was running about 30 miles an hour and the passenger train about 40 miles an hour immediately before the collision. Both engines, six passenger cars, and three freight cars were wrecked. The men in charge of the freight train misread an order which they had received from the despatcher giving them the time at which the excursion train was due at the several stations. This order read:

Salem 9.10
Plymouth 9.25

But these men read it "Salem.....9.25," and therefore allowed themselves 15 minutes more time in which to reach Salem than they could rightfully do; consequently they met the excursion train 1 1/2 miles before reaching Salem. The figures "9.10" were not exactly opposite the word Salem, and this appears to be the explanation of the mistake in reading, though the operator in writing the order had made dotted lines from the name of the station to the figures showing the time, in order to insure a correct reading. In consequence of the figures being nearer the top of the sheet, as related to the words, these lines inclined upward from left to right. The engineman did not read the order aloud to the conductor, nor was it read either by the fireman or by any brakeman, though all these readings are required by the company's rules. The station operator who delivered the order (but who was not the same one who had written it) says that the conductor in his presence read the order correctly.

Butting collision No. 30, between eastbound passenger train No. 30 and a westbound freight train about 4 o'clock on a very foggy morning, killing 26 and injuring 33 persons, was due to an error in sending or receiving the number designating one of the trains in a despatcher's order. Two passenger trains running in the same direction, Nos. 30 and 34, being behind time, the train despatcher sent an order to the freight train giving it notice that the passenger trains would be a certain number of minutes late, respectively, between certain stations, thus permitting the freight to continue on its journey to meeting points different from those at which it would have met the passenger trains normally. One order was sent and delivered correctly. A second order, dealing with only one of the two passenger trains, was wrong. As delivered, it named the passenger train as "No. 30 thirty"; but it should have read "No. 34 thirty-four." Being read "30," it gave a wrong number of minutes as regards that train, and this led to the collision. Train No. 30 was represented to be an hour and ten minutes late, when, in fact, it was but 40 minutes late. A number of other orders were sent about the same time, so that the despatcher had both these train numbers in his mind; and the state railroad

commissioners, who investigated the case, believe that the preponderance of evidence is in favor of the theory that the despatcher made the error in sending; but, so far as can be learned from the records at the despatcher's office and in the station telegraph office, and the testimony of the despatcher and of the station operator, the officers of the road say that it is impossible to decide which of these two persons committed the error. The operator wrote "No. 30 thirty," and declares that in repeating the order to the despatcher he sent in the same way that he had written. The despatcher, on the other hand, declares that he sent "No. 34 thirty-four," and that the operator in repeating wrote "No. 34 thirty-four." The operator had been in the service of the company at different stations for 23 years, and the despatcher had served as despatcher six years. The company gives good reputations to both of these men.

Derailement No. 8, causing the death of 14 persons and the injury of 19, is reported as due to some cause undiscovered. The train was running about 35 miles an hour on a 3-deg. curve, and it was thrown off the track just as it was passing a station. The cars in the front portion of the train ran to one side and were crushed against a locomotive standing on a side track, and the baggage car, reported as one of strong construction, penetrated the first passenger car—a smoking car—and killed or injured every person in this car, all the deaths being of persons riding in this car. The track was reported as in excellent condition, the rails weighing 80 lbs. per yard. The weight of the engine was 44 tons.

Collision No. 26, causing the death of 10 persons and the injury of 32, was due to a misplaced switch. The telegraph operator at S. turned an eastbound passenger train coming from single track to the left-hand instead of the right-hand of the two main tracks extending eastward from S.; that is, to the westbound track; and, after proceeding about three-fourths of a mile on the westbound track, this train collided with a westbound freight train. Under a general rule it is allowable for the operator at S. to send trains eastward to B. on the westbound track, and therefore the engineman took it for granted that the operator, in turning the train to the left-hand track, was acting in accordance with instructions from the despatcher; but in point of fact no such order had been given, and the operator had given a "proceed" signal under the mistaken assumption that the switch was set for the eastbound track. As soon as the train had passed his office he endeavored to telegraph to B., the next station east, and prevent the collision, but he was too late to do so. This operator had been in service at this office 15 days and in the service of the company five months 17 days. He had been on duty 20 hours, 50 minutes.

Collision No. 25 was due to the carelessness of an engineman in not keeping in mind a detail of a meeting order. Northbound train No. 38 and southbound train No. 35 were to meet at C. at about 10 p.m. The order required the southbound train to enter the side track at a certain switch, and the train was passing from the main line to the siding at this point when it was struck in the side by the northbound train. The engineman of the northbound, contrary to the terms of the order, assumed that the southbound was to enter the side track at another switch, and, although he saw it approaching, he thought that it was already on the side track. The northbound engine and four cars were badly damaged, and the wreck took fire from an explosion of gas in the tank of one of the passenger cars. Of the total damage of \$16,000, more than one-half is estimated as having been due to the fire, which includes the damage to five freight cars standing on the side track.

Collision No. 28 between a northbound and a southbound freight train was due principally to the failure of an operator to deliver a meeting order. He accepted the order from the despatcher after the freight train to which it was addressed had gone beyond his control. This operator, at L., had delivered a meeting order to two sections of a northbound regular freight train, but on account of damage to one of the engines, which necessitated changing them, so that the engine and engineman of the second train were assigned to the first one, both trains were delayed about an hour. In consequence of this delay, the despatcher sent a second order changing the meeting point, but this later order was not delivered. The men of both the freight trains claim that, just before departing, they asked the operator if he had further orders for them, and that he replied that he had none. The operator denies this conversation. The operator, a few minutes after receiving the second order, was relieved by the night operator, and in transferring his orders to the night man, informed him that the trainmen would come back to the office to sign for the order. This they did not do. The train despatcher is also held blameworthy for allowing the northbound train to pass another station 10 miles farther north, about an hour afterwards, without taking measures to stop it.

Collision No. 31, causing the death of two passengers and two trainmen, was due to errors in the writing of a telegraphic order, leading to its non-delivery, thus allowing a train to run past the meeting point fixed by the order. The order was to the conductor and engineman of train No. 412, and the train to be met was No. 611. In copying the order, the last number, 611, was copied 411. The order was received by the manager of the telegraph office, in

place of Operator B., who usually receives such orders, but who was temporarily out of the office. Just as the manager had finished, B. returned and took up the work of repeating the order to the despatcher. When he reached the last line and sent "411," the despatcher broke him and said "for 611." The operator acknowledged the correction but he did not properly correct his manuscript. He thought it was the address of the order (412) which was to be changed to read 611. After acknowledging the correction he sent the conductor's signature. An apparently correct repetition having thus been received at the despatcher's office, the despatcher authorized the order to be delivered to the inferior train at another station, so that it proceeded and met train 412. While the order was being written and repeated, the conductor of train 412 was standing at the window waiting for whatever orders the operator might have to give him; but he had not signed this order, and the operator committed a gross breach of the rules in telegraphing the conductor's name before the conductor had signed the order. After finishing with the despatcher, Operator B. gave to the waiting conductor two other orders, but omitted to deliver the one which he had just repeated. Operator B. decamped and would not appear at the investigation of the accident which was held by the superintendent. He wrote, however, to the superintendent of telegraph, claiming that he had not sent the conductor's signature over the wire. In the wastebasket of the office there was found the original order, with the address of the order, "To train 412," changed to read "To train 411," while on the table was a new order addressed to 411 which, evidently, Operator B. had made in place of the original, on the assumption that the correction which he had received from the despatcher referred, not to the train number at the end of the order, but to that in the address.

Table No. 3 gives the usual details of causes of accidents to employees in coupling and uncoupling cars, Table No. 3a the nature of such injuries, and Table No. 4 the details of causes of accidents to employees in falling from and getting on or off cars and engines.

Car Elevator for the Hudson & Manhattan.

At the Hoboken terminal of the Hudson & Manhattan Railroad's tunnels under the Hudson river a car elevator has been installed to carry passenger cars to and from the tunnels and the subway connecting with them. The passenger cars are 48 ft. long over all and 9 ft. wide; they weigh 64,000 lbs. empty and 85,000 lbs. loaded. The elevator has 100,000 lbs. lifting capacity and its platform is 50 ft. long and 12 ft. wide.

The elevator is in a wellway with reinforced concrete walls from the ground level to the tunnel. On the side walls are six steel columns supporting a steel girder framing directly over the hoistway and carrying the hoisting apparatus. This consists of two drum shafts each 50 ft. long, one placed near each side of the wellway. They are driven at their centers by four balanced worm gears, arranged so that the load on all four is equally distributed under varying platform loads. All thrusts are balanced by the worm shafts, which have right and left hand worms operating the worm gears. Both worms and gears run in oil baths in tight casings. They are driven by one 100-h.p. motor.

The main members of the platform are the two longitudinal steel girders, one under each rail. The floor is covered with diamond pattern steel floor plates. The platform is hung from 32 steel cables, $\frac{3}{4}$ in. in diameter, which pass under suspension sheaves below the floor and return to anchorage in the overhead structure. Half of the load is thus suspended directly from the overhead structure and half from the drums. In addition to these cables, there are eight counterweight cables of the same size. The platform weighs 32,000 lbs. and the counterweights, 64,500 lbs. The approaches to the elevator are protected by iron frame gates which close when the elevator platform is not at the landing. The movement of the elevator is controlled by a pilot switch operated by a hand shipping cable; the speed can be varied by the operator from 10 to 20 ft. per minute, the platform stopping automatically at the track levels. The rise from tunnel track to surface track is about 30 ft. The platform will be equipped with the third rail, charged only when the platform is at a track level, so that the cars may be run on or off under their own power. Provision has been made to hold the elevator platform securely in position while the cars are run on it.

In addition to the usual service of handling cars to and from

the tunnels, the elevator can be used for quickly changing motor trucks under a car body. For this purpose, the platform travels three feet above the surface tracks, blocks are put in place under the car body, the trucks are disconnected and the platform descends, leaving the car body suspended on the blocks.

This elevator has been in uninterrupted operation since it was installed, handling rails, ballast and other material in loads as high as 65 tons. It is believed to be the largest elevator in size and lifting capacity ever constructed. It was built and installed by the George T. McLauthlin Co., Boston, Mass., according to the design and patents of Martin B. McLauthlin.

Committee Reports at the Maintenance of Way Convention.

The ninth annual convention of the American Railway Engineering and Maintenance of Way Association will be held at the Auditorium Hotel, Chicago, on March 17, 18 and 19. Secretary Fitch has prepared the following outline of the committee reports to be submitted at this convention:

The committee on Roadway has had under consideration during the past year the subject of track elevation and depression inside cities, and also the practical work of grade and curve improvements outside cities, and presents in addition to its conclusions a summary of replies to its inquiries on track elevation and depression.

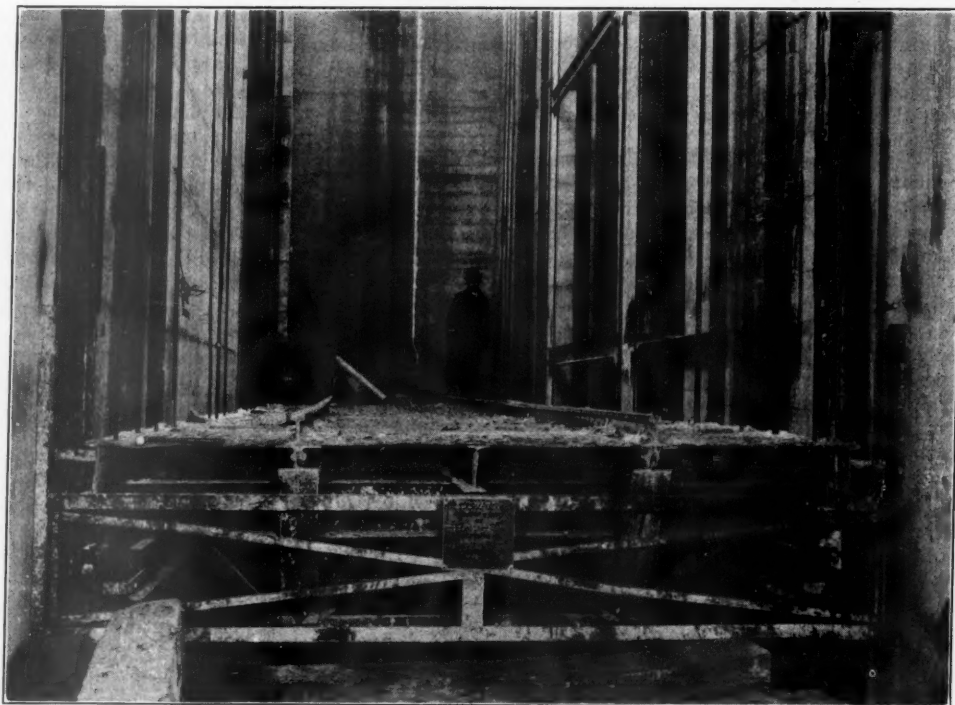
The Ballasting committee presents only a brief report.

The Tie committee presents a valuable report on the future policy of railroads with reference to sources of tie supply; a compilation of answers as to causes of failure of ties; also additional information on the live subject of tie preservation, together with a list of tie-treating plants in the United States.

The committee on Rail submits a series of blank forms for use in reporting rail failures.

The Track committee presents a report on turnouts and turnout material, including the recommended types of switch stands, switch points, frogs, guard rails and throat clearance; a report on the tiling of wet cuts and the curing of slides; a report on the subject of widening of gage on curves, the latter subject being a joint recommendation of the Track committee and a sub-committee of the Master Mechanics' Association.

Locomotive coaling stations and the use of reinforced concrete for roundhouses form the main features of the report on Buildings.



Car Elevator; Hudson & Manhattan Railroad.

Other subjects dealt with in this report are the best method of smoke removal; ventilation and heating of roundhouses; the use of movable and fixed cranes for facilitating locomotive repairs in roundhouses; arrangement of windows and roof lights, and proper ratio of light to floor surface in roundhouses.

The committee on Wooden Bridges and Trestles submits a valuable report on the cost of construction, maintenance and life of ballast floor trestles of the different types now in use, with designs explanatory of and types considered; an extension of the list of recommended safe unit stresses for timber; a report on the methods of preserving structural timber, their cost and efficiency, and their

influence on the strength of timber; a report on the question of a standard specification for structural timbers.

The Masonry committee presents for final adoption the specifications for stone masonry, and in addition a report on the most economical size or combination of sizes for stone to be used in stone concrete, as applied to the different classes of railroad work. This committee has also in preparation an exceedingly valuable report on typical standard designs now in use for masonry, culverts, both stone and concrete. The last-mentioned subject will be published after the convention in a special bulletin.

The subject of snow fences, snow sheds and other means to prevent snow accumulating, and best methods of clearing tracks and of snow removal, form the principal feature of the report on Signs, Fences, Crossings and Cattle-Guards.

The report on Signaling and Interlocking will be of especial interest not only to engineers, but to transportation officials as well. The committee has prepared a valuable report on the subject of a comprehensive system of signaling; and in addition presents as an appendix three interesting papers by members of the committee dealing with the matter of signaling.

The committee on Records, Reports and Accounts presents a report on the subject of individual ledger accounts and on the proper system of right-of-way and track maps.

Rules governing supervision of signals is the subject of the report on Uniform Rules. Rules governing supervisors of track and structures have already been adopted by the association in previous years.

The Water Service committee has taken for its subject this year a revision of matters previously adopted by the association, and the committee submits a condensation of the recommendations heretofore approved by the association.

The committee on Yards and Terminals presents an interesting and comprehensive report on the subject of hump yards. The report contains a large number of diagrams showing the practice of various companies in reference to hump yards.

Under the auspices of the committee on Iron and Steel Structures a series of experiments have been made during the past year on the effect of moving loads on railroad bridges. The tests have been made with 12 instruments specially constructed for this purpose, and the work of making the experiments has been performed by a number of experts, under direction of the sub-committee above named. A preliminary report is presented on the tests already made, and forms a valuable contribution to the literature on this mooted question. The experiments referred to have been made on the Illinois Central, Rock Island, Burlington and Nickel Plate roads. In addition to this feature, the committee's report contains a discussion on the care of existing bridges—inspection, methods of field work and records of inspection; also a report on the classification of bridges as to safe carrying capacity. As an appendix to this report is to be considered an interesting and instructive paper by A. F. Robinson, Bridge Engineer of the Atchison, Topeka & Santa Fe Railway System, on "Open versus Ballasted Floor Bridges," giving the results of the use of ballasted floor structures on the Santa Fe.

The committee on Economies of Railway Location presented an exhaustive report on the matter of train resistance in 1907. A report of progress will be presented this year, in addition, as an appendix, an interesting paper by A. K. Shurtleff (C., R. I. & P.), entitled "Time as an Element to be Considered in Grade Reductions."

The convention will open in the banquet hall of the Auditorium Hotel on the morning of March 17. Both morning and afternoon sessions will be held. An evening session will be held on the night of the first day of the convention. The annual dinner will be given on the night of the second day.

Railroad Station Improvement.*

At the beginning of 1907 I congratulated myself that all the railroads in the country were not only convinced of the desirability and the advantages of artistic and well-kept station surroundings, but that they were rapidly becoming so interested and enthusiastic in the work of co-operation with the Railroad Department of the American Civic Association that my work of persuasion was a thing of the past, and that in the future it would be simply a steady growth and development along the lines of artistic education, and the carrying on of missionary work in the railroad towns by the establishment of village improvement associations.

But last spring, instead of the encouragement to which we had become acquainted, orders were issued on many railroads, "no parking this year." This was followed from time to time with like orders regarding all improvements which were not absolutely necessary; in other words, retrenchment was the order of the day.

At first it seemed possible that this condition was confined to the West, or particularly where adverse state legislation had affected the

business of the railroads, but I was soon led to fear that it was national in its scope and was the result of the governmental attacks which had disturbed the entire railroad world. To verify my suspicion I wrote to the heads of various railroads throughout the country, and the almost universal reply was along this line:

"I beg to advise that under existing financial conditions we are not giving much thought to questions of esthetic character, but we are trying to maintain the condition of our property for safe operation, also to maintain a sanitary condition in and about our coaches and buildings; we are not doing, nor do we contemplate doing in the near future much, if anything, for purely esthetic reasons."

All the officials assured me of their interest and appreciation of the work and of their keen regret for the conditions which compelled them to relinquish the work. And I am glad to say that orders have been universally given to preserve and care for the work which has already been done along the line of station ground improvements. The few railroads, I am advised, that are contemplating new work this year are the Delaware, Lackawanna & Western, the Grand Trunk and the Norfolk & Western.

I find my consolation in knowing that the work which we have already done can never be wholly undone. Many village improvement associations have emanated during the past five years from the little station park which was the nucleus for future park systems and general civic improvement. The massed planting to shut off the unsightly secondary buildings at the station was a suggestion to the villagers to be carried out in screening off their backyards, the grouping of the shrubs at the corners of the grounds where the blending of the different foliage made a beautiful and ever-changing picture was a desirable contrast to the straight lines of shrubs from the front door to the gate. The manner in which we have proven to the people the uselessness of fencing off the parks and converting them into a graveyard scene has led to the obliteration of door yard fences, thus transferring the ugly village streets into beautiful boulevards. All know how infectious the spirit of civic improvement is. From this beginning has usually come the improvement of the high school grounds, the courthouse square and the formation of a village improvement society and the general crusade against all that detracted from civic beauty.

There is a mistaken idea in some minds that railroad station ground improvements emanate from the village improvement association. The reverse is generally true. I have known many instances when the townspeople have sent their earnest request to the railroad officials to improve their station surroundings, but where upon investigation it was found that for many blocks on every side of the railroad property there was not one redeeming feature. Tumble-down buildings covered with circus posters, stock-pens, garbage piles, filth and squalor of every description led up to the railroad property, which although not in any sense artistic or attractive, was usually decent looking. The inconsistency of the request, under those conditions, was the first thought that occurred to the officials, and the suggestion that they clean up the town before troubling about the railroad property was a remark that might reasonably be pardoned. It is a most unusual thing for railroad officials to refuse to co-operate with a town on village improvement lines, although they sometimes balk at the suggestion of the townspeople that they lead the procession. I would suggest to any interested in this matter that any time they want a new depot or station park, or improvements along these lines, the best way to interest and influence the officials would be to clean up and improve the streets and property leading to the railroad, so that the contrast would reflect discredit upon the latter. I doubt if co-operation on the part of the railroad officials would ever be refused.

I will give as one illustration something that has come under my observation during this last year. In a northern Wisconsin lumber town (Tomahawk, on the C., M. & St. P.) an interest in civic improvement which had been created by illustrated lectures through the efforts of the railroad department led to the formation of an active village improvement organization and the formulation of plans for a more beautiful town. This meant the removal of the warehouses from the heart of the village to the suburbs, necessitating a heavy expense, but a purse was made up to assist in this work, and a committee waited upon the officials of the railroad, who without the slightest hesitancy promised to build tracks to the new location, remove the old tracks and convert the property on which the warehouses stood into a beautiful park extending for several blocks through the center of the town. This work is now in progress and it is expected that before another year a wonderful transformation will be effected.

Other interesting work which has been accomplished by this town was the passing of city ordinances regulating the width and style of sidewalks, which are to be concrete, with combination concrete gutter and curbs, grass park midway between gutter and sidewalk, trees of uniform variety, and sizes to be planted at certain distance in the parkway, the removal of telegraph and telephone poles into the alleys and various other reforms. A carload of shrubbery (purchased at wholesale through the railroad company by a public-spirited citizen, who, by the way, is a member of the American

*A report, presented at the annual meeting of the American Civic Association at Providence, R. I., by Mrs. A. E. McCrea, chairman of the Railroad Department.

Civic Association), and the services of a landscape architect, were placed at the disposal of the townspeople, who for a nominal sum could avail themselves of the opportunity to have their grounds planted and arranged artistically. Those who were too poor to pay were given the same consideration as the others, and the whole town is transformed from ugliness to beauty through this kindly act of one public-spirited man.

I could give many more examples of similar nature, but I only want to urge on the department the greatest of all advantages—that of co-operation between the people and the railroad.

Othniel Foster Nichols.

Othniel Foster Nichols, one of the consulting engineers of the Department of Bridges, New York, and well known to readers of the *Railroad Gazette*, died suddenly of apoplexy at his home, 42 Gates avenue, Brooklyn, February 4. His death was without warning, as he had been in his usual good health, and on Monday, barely 12 hours before he died, he had taken lunch with his friends at the engineers' table in the Astor House.

Mr. Nichols was born July 29, 1845, at Newport, R. I., and received his education at the Brooklyn, N. Y., public schools and at Rensselaer Polytechnic Institute, where he graduated as a civil engineer in the class of 1868. Immediately after graduating he began his professional career as assistant engineer on the work of laying out Prospect Park in Brooklyn. His next position was assistant engineer of the Greenwich Street elevated railroad in New York, and he built the first elevated railroad foundations north of Cortlandt street. In 1870 and 1871 he became assistant to Edward Cooper, President of the New Jersey Steel & Iron Company, and from this office he went in 1871 to the Lima & Oroya Railroad in Peru as assistant engineer. He remained two years in charge of tunnel location and construction on this road and then became division engineer of the Chimbote Railroad, where he had charge of work of the same kind.

Mr. Nichols returned to the United States in 1876 and was assistant superintendent and engineer of the Edgemoor Bridge Company in its contract for building the Sixth Avenue Elevated Railroad in New York. The work was delayed by injunction and Mr. Nichols entered the service of the Park Department in charge of sewer work in the annexed district. In 1878 he went to South America again, this time as resident engineer of the ill-fated Madeira & Mamore Railroad project in Brazil, and subsequently spent the first half of 1879 in London in connection with litigation which grew out of this enterprise.

Mr. Nichols always retained a vivid impression of his South American experiences. He saw clearly the possibilities of development in the region where he had worked but had profound respect for the difficulties of getting anything done there on account of the climate, of labor conditions, and the distance from the base of supplies.

In 1879 and 1880 Mr. Nichols was assistant engineer in the bridge shops of the New Jersey Steel & Iron Company. In 1881 he was for a time assistant superintendent of the Peter Cooper glue factory, and from that time until 1885 he was resident engineer of the Louisville & Nashville bridge over the Ohio river at Henderson, Ky. In 1886 he was made chief engineer of the waterworks at Westerly, R. I., but resigned his position to become principal assistant engineer for the Suburban Rapid Transit Company in New York City. When this company was consolidated with the Manhattan Railway he became chief engineer of the Brooklyn Elevated and designed and built about half of the elevated roads in Brooklyn belonging to that company. In 1892 and 1893 he was general manager as well as chief engineer of the company, and at that time made his first surveys for the Williamsburgh bridge, which was then intended to be built by a private company allied

with the Brooklyn Elevated. When Leffert Buck was made chief engineer of the Williamsburgh bridge, in 1895, he named Mr. Nichols as his principal assistant, and Mr. Nichols held this position until July, 1903, when he was appointed chief engineer of the Department of Bridges. Since 1905 he has been consulting engineer of the Department of Bridges, in charge of the Manhattan and Blackwells Island bridges. He was awarded the Telford premium by the British Institution of Civil Engineers in 1897. He was also ex-president of the Brooklyn Engineers' Club and a member of the American Society of Civil Engineers, American Society of Mechanical Engineers Society of Municipal Engineers, New York Engineers' Club, Brooklyn Institute of Arts and Sciences, American Geographical Society and the Institution of Civil Engineers of Great Britain.

The engineering profession will be shocked and grieved by the news of the sudden death of Othniel Foster Nichols, one of its distinguished members. The city of New York loses a most faithful servant, whose value was never greater than at present when enormous bridges are being built, to the design and construction of which Mr. Nichols has given the best years of his life—a life ripe in experience covering a wide field of railroad practice, shop practice, bridge engineering and erection, and especially the study and solution of transportation problems. In all these branches Mr.

Nichols was an expert of high rank, and his professional attainments were united with rare executive ability. He had a live interest in everything pertaining to the welfare of the profession and to its progress. Membership in the American Society of Civil Engineers, in the Institution of Civil Engineers, in the Society of Municipal Engineers, in the Alumni Association of his *alma mater*, and in the other organizations to which he belonged, he did not regard merely as recognition of professional standing. To him it meant opportunity for further work with corresponding duties, which he fulfilled as few men have the energy to do in continuous efforts for the elevation of the profession and the maintenance of its dignity. Witness his contributions to its literature in the Proceedings of these learned bodies and his eager part in their discussions, his loyal service as head of the Engineering Section of the Brooklyn Institute of Arts and Sciences.

He was a most devoted friend. His friendship was not confined to intimates, but numberless acquaintances have reason to bless his memory for acts of unvarying kindness and substantial aid. Not only to young engineers just starting in the profession, but to men of every rank and calling, to widows and the fatherless, and to those otherwise unfortunate was

he especially helpful. A most genial companion, he was a strong, energetic, generous, wise, hopeful man. His public and private career was beyond reproach. An inspiration to his fellows, a model of fidelity to duty, his place cannot be filled and his memory will be kept green by all who knew him.

N. F. R.



O. F. Nichols.

The Prussian State Railroads have had since 1901 an uninterrupted growth in traffic and gross earnings, and until this year also a satisfactory yearly increase in net earnings, which in 1906 were 2½ per cent. more than in 1905 and 35 per cent. more than in 1901. This year the increase in gross has continued, but as in some countries not so far off, the expenses have increased so much more that there will be a decrease in net. The reasons given for this are precisely the same as those which account of the notable decrease in net earnings in this country in 1907. The Prussian fiscal year ends with March. The latest reports do not show any decrease in gross earnings, such as has occurred here recently. In November the Prussian State Railroads had an increase of nearly 5 per cent. in gross earnings, while for the eight months of the fiscal year the increase was 5½ per cent. The railroads of the whole German Empire had an increase of more than 4½ per cent. in November. The demand for coal could not be satisfied; but the iron works were not the urgent buyers.

Transmission Line Crossings Over Railroads.

BY RALPH D. MERSHON.

The rapid increase in the number of electric transmission lines and the distributing circuits therefrom, is rendering every day more important and more perplexing the question so frequently encountered as to the protection, if any, which should be provided at railroad crossings.

The fear which the steam railroad operator has in regard to such crossings arises from two sources. He fears the damage which might result through mechanical agencies, in case the transmission line should fall upon the track. He fears, also, the damage which he thinks might result through electrical agencies. The fear of the electric current is usually the greater, probably because of the fact that most steam railroad operators have had little, if any, experience with electricity, and they attach to it more or less of the mysterious dread which people have for it generally.

The protection for which the railroad man generally asks, is a steel bridge constructed underneath the transmission line for that portion of its length which is across the railroad company's right-of-way; or at least for that portion of its length which is across the tracks. In some cases, it has been required that the transmission line be carried on insulators attached to this structure; such a requirement is an undesirable one from every standpoint.

There can be no question that a transmission line can be made as strong as any steel protecting bridge that can be installed, and, in general, strength can be obtained at a great deal less expense than is involved in installation of the bridge. A simple span of wire or cable supported at each side of the right-of-way, on steel structures if necessary, can be made as strong, both as to supporting structures and as to the cables, as any bridge which can be erected. It seems foolish, therefore, to insist upon the installation of a bridge below a transmission line for fear that, through mechanical agencies, the transmission line may be thrown down.

Probably no railroad operator would make special objection to have built across his tracks a construction similar to that of a well designed transmission line, if he knew no current was to be put upon it; but, in some instances, the mere idea of having current on the wires seems to introduce immediately a fear of the construction—both mechanically and electrically. In such cases, the ultimate source of the fear and objection to the transmission line crossings may be said to lie in the fact that the lines carry an electric current; and it is well, therefore, to examine into the possible ways in which the existence of an electric current on the lines may affect the safety of the property or employees of the railroad.

Assume a crossing with the same side clearance, overhead clearance and factor of safety as would be allowed in the case of a bridge. Assume that there is no electric current on the wires. Under such conditions, no damage except such as is equally likely in the case of a bridge can result to the property or employees of the railroad company.

Now assume that the electric current is put on the crossing. The added possibilities of danger are as follows:

- (1) The possibility of overhead contact either direct or through some conducting object.
- (2) The presence of the electric current in case the structure is thrown down by a train wreck, by wind, or other mechanical forces.
- (3) The possible effect of the electric current in causing the line wires to fall.

The probability of (1), overhead contact, can be indefinitely reduced by increasing the overhead clearance, if such clearance as would be allowed for a bridge is not considered a sufficient insurance.

The probability of (2) can, so far as wrecks are concerned, be indefinitely reduced by sufficient overhead and side clearance; and, so far as wind or other forces are concerned, by proper design and construction with reference to ice and wind loads. The practice in these matters in the case of bridges would seem to be amply sufficient, especially in view of the fact that, as mentioned later on, in a well designed and properly operated transmission system, anything which would cause the line wires to be thrown down, would cause the power to be cut off by reason of the resulting short circuit.

The question, therefore, finally resolves itself into an examination of (3), the effect which the presence of the electric current might have in causing the line wires to fall upon the tracks.

The only conceivable way in which the presence of the electric current could be the cause of the contingency mentioned is that of the establishment of an arc which should burn off one or more of the line wires. Such an arc might be established between two or more of the line wires, or between one or more of the wires and the structures supporting the transmission line. An arc between a line wire and the supporting structure could occur only in case the structure is metal, or in case the insulators are supported upon metal pins connected to each other or to ground.

An arc between the line wires, if it be instituted at a point distant from the supporting structures, can hardly be conceived of as due to anything other than the swinging together of the wires, or to their having thrown across them, either maliciously or by accident, some conducting object. The chance for an arc to be started by the wires swinging together can be removed entirely by putting them sufficiently far apart. The chance for an arc to be established by something being thrown across the line wires can be made very small by recourse to the same expedient.

The occurrence of an arc between one or more of the line wires and the insulator pins or the steel structures carrying them, might be due to a direct puncture of the insulator by electrical means, or to breakage of the insulator by mechanical means, or to the establishment of an arc around the insulator to the pin by an initial creepage of current over the insulator surface, when the insulating value of such surface had been reduced by a film of moisture, dirt or other conducting or semi-conducting substance. It should be noted that the first and last of the three possible causes mentioned would be extremely unlikely except in the case of high voltage lines, and, even then, not at all likely, if the insulator be well designed, except in the case of lightning.

In the case of the occurrence of an arc from any of the causes mentioned, the arc would not, with a properly designed transmission system, exist for any considerable portion of time, since its occurrence would cause the automatic circuit breaking appliances in the generating station to operate, thus opening the circuit and stopping the arc. The amount which such an arc could do towards burning a line wire asunder, or otherwise damaging the crossing, would depend upon the amount of power behind the arc, the length of time it lasted, and the size or mass of the metal from which the arc was drawn. That is to say, it would depend upon the amount of heat generated in the arc tending to melt the wire or other metal concerned, and the amount of metal there was present to conduct away and absorb this heat, and thus diminish the melting action of the arc. The size and weight of the wires and other metal parts involved could be so proportioned relative to the destructive potency of any arc which might be formed that they would easily withstand the melting action, without being burned off, until such time as the automatic protective devices at the generating station opened and the arc ceased.

It would even be possible to make such provision that, in case an arc formed, it would rupture itself, even if the automatic protective devices at the generating station did not operate; and so that it would rupture itself before any serious damage to the crossing could occur. To accomplish this, it would be necessary to properly proportion not only the metal parts, but also the distances separating those parts between which an arc could occur; that is, the distances between the line cables and between the line cables and the supporting structures. Such proportioning should be done with reference to the voltage and power capacity of the transmission system; the less the voltage, the less the distances would have to be; and the less the power capacity of the system, the lighter could be the metal parts.

It would appear, therefore, perfectly possible to design a transmission line crossing so that it could not constitute a source of danger from either a mechanical or electrical standpoint. Such a crossing would preferably be one along the following lines:

(a) It should be so constructed that the line conductors (line wires or cables) and the supporting structures at each side of the track would be of proper strength to withstand the ice and wind loads which might come upon them. It should be self-sustaining; that is, should be capable of standing up under the action of wind and ice without reference to the remainder of the line, so that the line, on one or both sides of the crossing, might break without interfering with the crossing itself.

(b) There should be sufficient overhead clearance between the line and the track, so that there would be no possibility of contact except by deliberate intent.

(c) The line conductors should be far enough apart so that they could not swing together.

(d) The line conductors should be sufficiently massive so that an arc might exist between them for several seconds, without danger of burning or melting them off.

(e) If the supporting structures are of steel, or the insulator pins are of metal and the pins connected to each other, or to ground, the insulators should have cast metal caps cemented upon them. These caps, or extensions of them, should extend out on each side of the insulator for some distance along and underneath the conductor, in order to further protect the conductor, or else the conductors should have, in addition to the caps, a protection from arcs in the form of a serving of wire upon them for some distance on each side of the insulator. The result of such protection will be that an arc formed near the insulator will expend itself upon the serving wire, or metal casting, instead of upon the conductor itself.

It is not to be understood from the above that a crossing would

necessarily consist of a single span. It might consist of a series of spans, meeting the above requirements, where several spans were necessary for crossing a number of tracks, such as would be found in a railroad yard.

A crossing constructed on the above lines would be as safe as any reasonable individual could ask, and at the same time would be a great deal cheaper than the steel bridges sometimes insisted upon.

The matter of steel protective bridges is a very serious one to the transmission companies, not only on the score of expense of the bridges themselves, but because of the difficulty often met in installing them or getting permission to install them, especially when they are required in towns and are objected to by the municipality. If they are insisted upon, it will greatly retard the development of those sections of the country fortunate enough to be within electric reach of cheaply generated power, since the requirement of a bridge for a railroad crossing will, in many cases, prohibit the supplying of small customers with power. This, of itself, is a matter of importance to the railroads in that on the

The Railroads of Peru.

BY J. R. CAHILL.

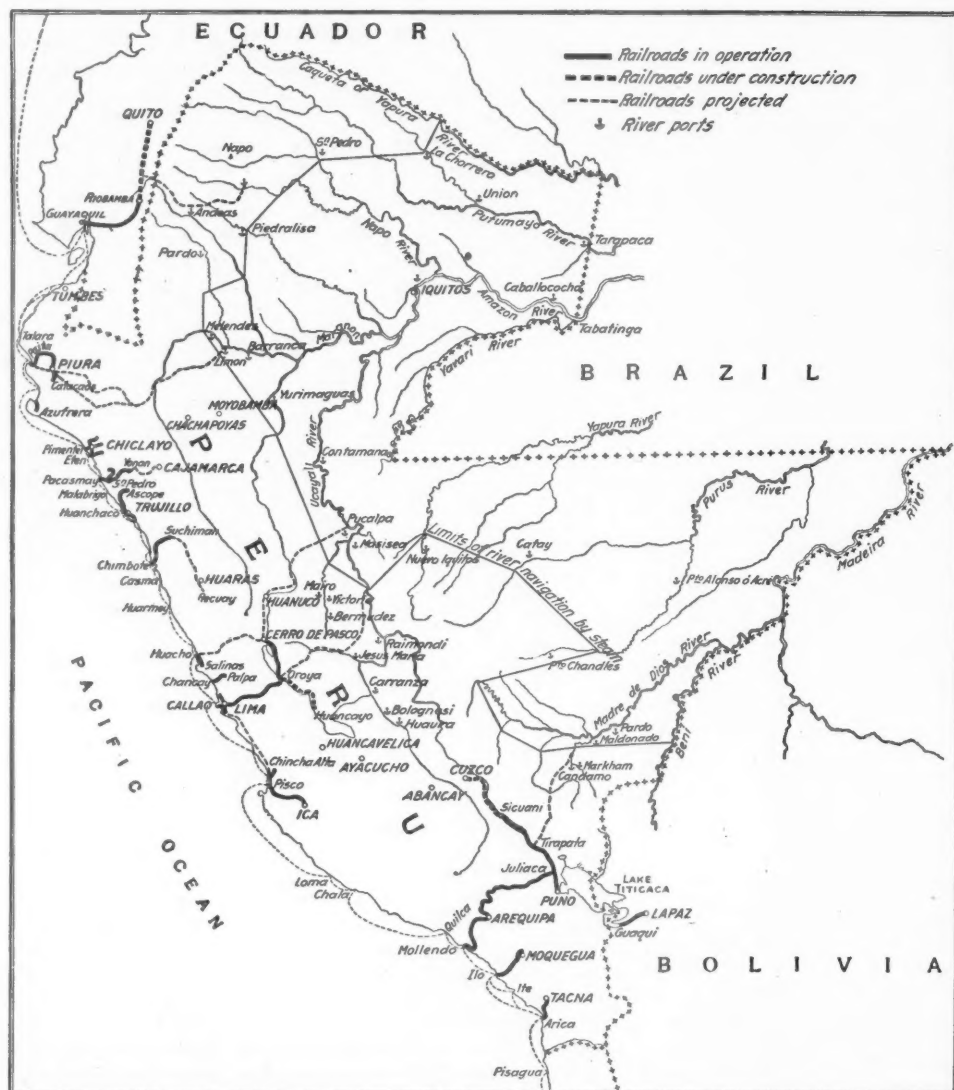
In order to understand the location and workings of the railroad systems of Peru it is first necessary to get an idea of the physical features and industrial condition of the country. In size Peru is nearly one-fourth as large as the United States. It is divided topographically into three zones; the coast region, 1,500 miles long varying from 20 to 80 miles wide; the Sierra or Cordilleras of the Andes averaging about 300 miles wide; and the Montaña on the eastern slope of the Andes extending down way into the basin of the Amazon. The Montaña comprises more than half the area of the country and is a tropical jungle immensely rich in rubber, hardwoods and gold. The Cordillera region includes two ranges of the Andes running parallel to the coast. It is the rich mineral belt and also supports a stock raising industry. The coast is given up to the production of sugar and cotton for export and tropical fruits and vegetables for home consumption. It is productive only near the rivers where irrigation is easy, the rest of the land being barren. Irrigation plans are being projected that will bring much more of the land under cultivation.

There are three general types of railroads: Trans-Andine roads, extending from the coast eastward across the Andes; short lines running from the seaboard up into the valleys of the coast region, and lines running in a general north and south direction through the Cordilleras. The first type carries the cotton and sugar produced in the valleys down to the ports at the termini and carries back imported manufactured commodities. The trans-Andine lines carry the products of the Montaña and the mines of the Cordillera down to the coast along with the agricultural products of the coast region. They carry back mainly lumber and other mine supplies. The lines running north and south exist for the immediate purpose of developing the mines and of serving as feeders for the trans-Andine roads. Eventually they will form a means of communication between the trans-Andine roads.

There are at present about 1,340 miles of railroad in Peru. Of these 1,053 miles are of standard gage. The remainder, for the most part unimportant lines, are of 3 ft. or of meter gage. There are two lines that may be called trans-Andine roads: the Central Railroad, from the port of Callao to Oroya on the east slope of the Andes, 138 miles, and the Southern Railroad, from Mollendo to Puno, 325 miles. There are three roads running north and south through the Cordillera: The Cerro de Pasco road from Oroya to Cerro de Pasco, 83 miles long; the Southern Road's branch north from Juliaca to Chiciacupi, 150 miles long; the Central Road's branch south from Oroya, about 30 miles of which has been built. This road is being continued to Huancayo. The Juliaca-Chiciacupi branch is being extended now to Cuzco. Eventually Cuzco and Huancayo will be connected.

Most of the lines are the property of the government of Peru. These are, however, operated by the Peruvian corporation, an English company that in 1890 leased the roads from the state for a period of 66 years. The Peruvian corporation assumed the foreign debt of Peru and received large land grants and a monopoly of the guano deposits together with certain other privileges. The corporation agreed to make certain extensions of roads and the government to pay \$400,000 per year to the corporation. Neither side was able to carry out the bargain and the agreement has since been readjusted, the Peruvian corporation agreeing to complete extensions from Oroya to Huancayo, Sicuani to Cuzco and Chilite to Yonan by September, 1908. The road completed a short time ago from Oroya to Cerro de Pasco was built by American capital to develop the Cerro de Pasco copper properties. The road and smelters represent at present an investment of some \$17,000,000. This road will also allow the coal fields in this region to be developed.

The railroads of the Peruvian corporation were mismanaged for many years and did not begin to earn money until the Cerro de Pasco enterprise furnished them with increased traffic. This business, combined with the heavy traffic from Mollendo to La Paz



Railroad Map of Peru.

welfare and progress of the community depend the amount of, and increase in, the railroad company's revenue, but there is an aspect of the question aside from this which should be the subject of much thought by railroad men. The time is undoubtedly near at hand when all of the principal railroads of the country will equip a portion at least of their lines for electric traction. If this is done, the railroads cannot hope to be free from the necessity of carrying their line conductors across not only their own rights-of-way, but the rights-of-way of other roads. If the railroad men now insist upon the elaborate means of protection which have been insisted upon in some cases, and crystallize public opinion to the idea that such elaborate protection is necessary, they themselves will be confronted with the necessity of making use of the elaborate and expensive protection in question.

It behooves the railroad man, therefore, to consider this matter of crossings very carefully and with the utmost spirit of fairness, since in so doing he will not merely serve the interests of the transmission companies, but also the interests of his own and other railroad companies in the future.



Peruvian Railroad Scenery.

brought about by the extensive railroad building now going on in Bolivia, is now placing the Peruvian corporation on a paying basis. In the year 1905-1906 the preferred stock received a 1½ per cent. dividend, and in the year ending June 30, 1907, the gross traffic receipts amounted to \$8,260,000, an increase of \$905,000. The Peruvian corporation is now negotiating with American and German capitalists for a loan of \$15,000,000 to enable it to improve its rolling stock and roadbed so as to be able to handle the traffic that is now swamping it.

The Central Railroad is a piece of the most difficult mountain construction ever built. In a space of 138 miles the road has six switchbacks, 10 large bridges and a dozen smaller ones, and is operated over 4 and 4½ per cent. grades. The cañons are so steep that tunnels are far more frequent than deep cuts. There are



Arequipa Station; Peruvian Southern.

56 tunnels in 80 miles of road, and very few of these are on tangents. Curves as sharp as 15 deg. are used. The cañon walls are so precipitous that in many cases in side hill cuts heavy retaining walls are built to reduce the amount of fill. At an elevation of 10,920 ft. above sea level at the Infernillo bridge the road plunges from a tunnel out across a steel truss hung between the mouths of two tunnels a couple of hundred feet above the river. At the summit is the Galera tunnel, three-quarters of a mile long at an elevation of 15,700 ft. In 98 miles the road rises 15,160 ft. in elevation. The average grade between Callao and Oroya is 2½ per cent. The 138 miles from Callao to Oroya cost originally \$22,000,000, and was built by Henry Meiggs, an American. Twenty-four-ft. rails were used, weighing 60 lbs. per yard, and all rail renewals have been of the same kind of rails. Redwood ties

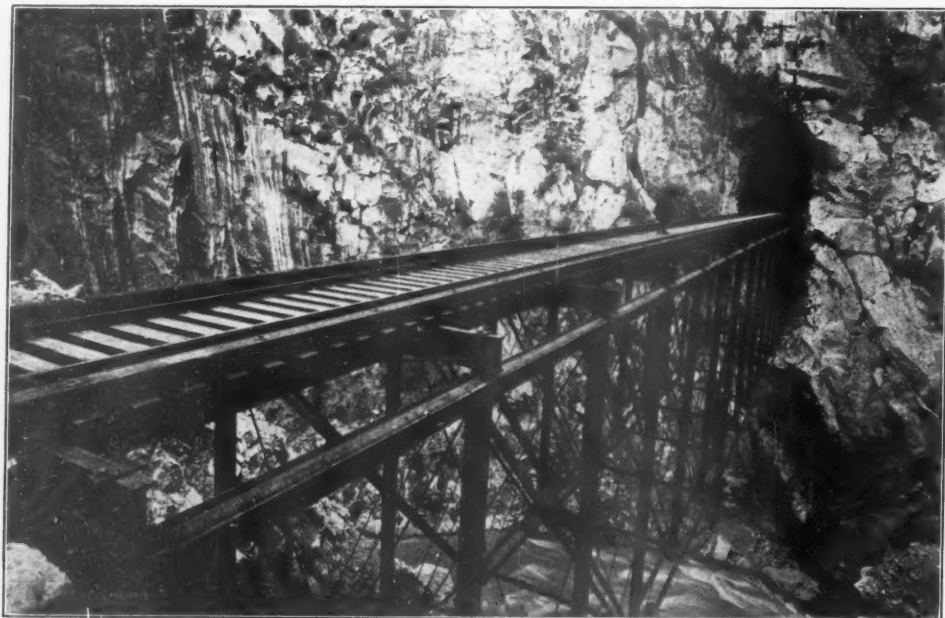


Mollendo, Terminus of the Peruvian Southern.

brought from California and Oregon are used. There are no tie plates. The curves are so sharp that the rails are tied together with steel rods. Steel rails with steel rail chairs are also used as additional ties on sharp curves. The track is ballasted with rock and gravel. Very little difficulty is encountered with the drainage of the roadbed as the rainfall is not very heavy. The principal difficulty is the frequent occurrence of rock slides resulting from steep slopes in side hill cuts. Owing to the high cost of lumber and its rather short life in parts of Peru, as little wood as possible is used in railroad structures. The main stations are built of Oregon pine, but all sheds and minor buildings are of corrugated iron laid on wooden frames for the smaller buildings. For larger sheds, cast-iron columns and steel roof trusses covered with corrugated iron are used. The fences along the right-of-way through the Rimac valley are built of large blocks of adobe about 2 ft. thick. All the telegraph posts are of iron. Very little concrete work was used. Water tanks are of steel supported generally on cast-iron columns.

The natives, having been raised in a country devoid of timber, are naturally very skilful in masonry work. The bridge abutments are all ashlar masonry, and the tunnels when not cut through solid rock are lined with ashlar. Side hill cuts are supported by heavy dry rubble retaining walls. The bridges are all steel structures. For short spans, Warren girders are used. The longer bridges are Pratt trusses or viaducts. There is one cantilever bridge. Old style Phoenix columns were used to some extent but most sections are channels and plates. Joints are generally riveted.

These bridges are now proving too light for the heavy locomotives necessary for handling the great increase of traffic, so they are shortly to be replaced. The passenger engines now used are of the Mogul type. The freight engines are of the Consolidation type. The new locomotives are of the Mastodon class, and their weight of 60 tons is proving too great for the present bridges. All the locomotives except a few small switching engines are of American manufacture. The old freight cars were all small ones following the English practice, but after the construction of the American Cerro de Pasco road the English company commenced using the ordinary 36-ft. American pattern car of 50,000 lbs. capacity.



Infiernillo Bridge and Tunnel 32, Elevation 10,920 ft.; Peruvian Central.

There are a few steel ore cars. Corrugated iron is used in repairing the roof of box cars. All the cars bought during the last few years have been of American manufacture.

Train hands and enginemen are for the most part drawn from the best of the native "Cholo" class, a mixture of Spanish and Indian. All track work is done by Cholo laborers, who are paid about 75 cents a day. The station agent and general clerical staff is composed of Peruvians of Spanish descent. The management is, of course, English. The standard of honesty among the train hands and station agents is very low and there is a great deal of

difficulty in preventing stealing. The passenger rates, first class, are about 5 cents, gold, per mile. Cholos ride in the second class cars and Gringos and Peruvians ride first class. The freight rates are very high. The road, through insufficiency of rolling stock, has great difficulty in handling the traffic offered it, and this traffic is bound to increase to still greater proportions as new mines are being opened up and as the Cerro de Pasco mines are not working up to their maximum output as yet.

The Cerro de Pasco road that connects with the Central Road at Oroya is operated by the American capital owning the Cerro de



Near Arequipa; Peruvian Southern.

Pasco mines. It is a far more modern road than any of the Peruvian corporation's properties, and is able to deliver more freight at Oroya than the Central Railroad can handle. The lack of facilities on the Central has been a big hindrance to the development of the Cerro de Pasco mines.

The Cerro de Pasco Railroad is 83 miles long, and its elevation ranges from 12,000 ft. to 14,000 ft. The grades are lighter, curves easier and bridges fewer than on the Central Railroad inas-

much as elevation does not have to be developed. The road follows along a cañon for about 15 miles and then crosses a level pampa. The maximum grade is $2\frac{1}{4}$ per cent. and the maximum curvature is 16 deg. Seventy-lb. rail is used, some of it of English manufacture. All rolling stock is of American manufacture. The output of the Cerro de Pasco mines, after it leaves the Cerro de Pasco Railroad at Oroya, is being handled so badly by the Peruvian Corporation that the construction of a road parallel to the Central Road has been considered by the American company.

The Cerro de Pasco company holds a concession for a railroad from the Cerro de Pasco road eastward into the Montaña to the navigable headwaters of the Ucayali river. This will probably be built and will supply the mines with coke and lumber and at the same time open up an immense rubber territory. This means new business for the Peruvian Central, and if it does not handle the traffic better it means another reason for a competing road from the Cerro de Pasco line to the coast.

The other of the two most important Peruvian railroads is the Southern Railroad running from the port of Mollendo up to the city of Arequipa, then over the Andes to Puno, on the shores of Lake

Titicaca, where it connects by steamer with La Paz, in Bolivia. At Juliaca a branch shoots northward along the Cordillera towards Cuzco. It is now constructed as far as Chiciacupi, 150 miles, making the entire mileage of the system 475 miles. This construction is not of the sensational type of the Central Road. The cañon walls are not so steep and precipitous, and the bridges and tunnels of the Central line have their counterpart in deep fills and cuts on the Southern. There is very little rainfall, so drainage channels need not be provided. Sixty-lb. steel is used, but the rails are in very poor condition and are now being re-

placed with 80-lb. section. Old rails are being sold for almost 2 cents, gold, per pound, for use in the towns for building construction. The rolling stock is of the same general description as on the Central Railroad. The new heavy locomotives are being used on this line, as there are few bridges. Such bridges as there are will be replaced by new structures now being fabricated in the United States. Curves are now being tie-plated.

The employees are of the same class as on the Central Road. Officials of the road blame the poor class of labor for the poor train service, and it is undeniable that the Peruvian Cholo gives poor service, being indifferent whether he works or not. It is also hard to get men of sufficient education to make good station agents and clerks. Owing to the small number of trains run it is very difficult for officials to travel between different points on the line without great waste of time. No motor cycles or motor cars are used.

The principal traffic of the Southern Railroad, at present, is furnished by the eastbound haul of railroad supplies for Bolivian railroad construction and for the extension of the Peruvian road towards Cuzco. Normally the eastbound freight consists of manufactured commodities supplying the mines of Bolivia and the Cor-

is being built that will improve this somewhat but it will be an expensive work. It was started with riprap but it is now proposed to finish it with five-ton blocks of concrete placed with steam cranes. It is probable, though, that the Arica-La Paz road will not be completed for several years. In the meantime the Southern road will carry the railroad material for the road building in Bolivia.

Bolivia has just received \$14,000,000 from Chile and Brazil in indemnities. This will all be devoted to railroad building, and with this money as an inducement, American capital is taking an interest in the construction of the roads. A contract made with Speyer & Co. and the National City Bank of New York provides for building 863 miles of roads. The total cost is estimated at \$27,500,000, and the government contributes \$12,500,000, which shall be repaid within 25 years. This leaves the government with capital for future extensions. The construction was started in 1906 and is being pushed rapidly. American rolling stock and track material is being used.

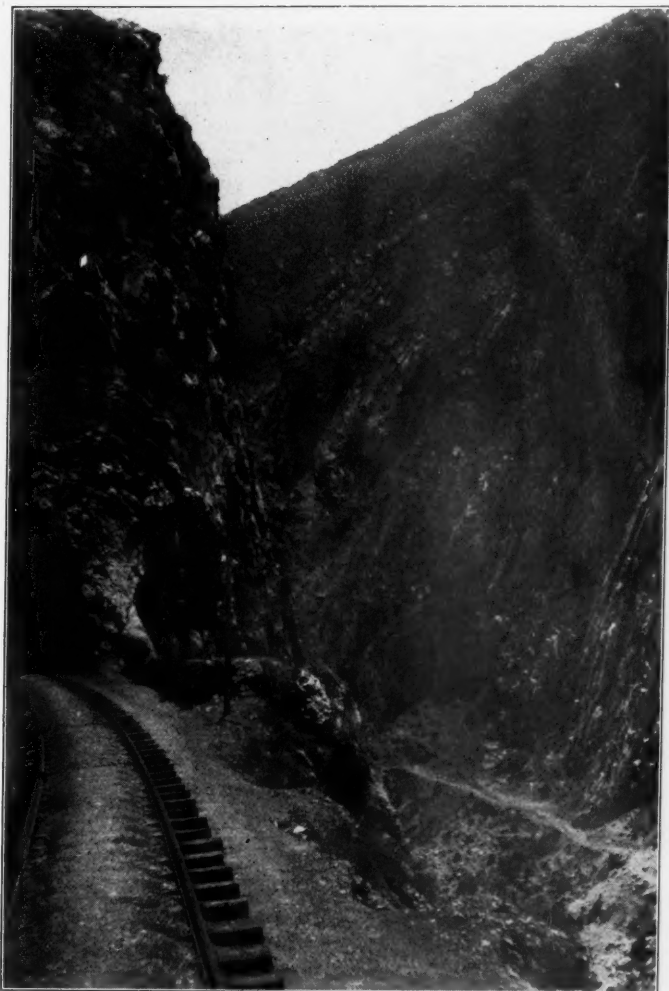
There are three roads to be built, the La Paz-Topiza line, the Oruro-Cochabamba line, and the La Paz-Puerto Pando line. The La Paz-Tupiza road will be 530 miles long. It connects with the Antofagasta road at Oruro, giving La Paz another connection with the coast and hence creating more opposition to the Southern Railroad of Peru. It will also connect at Tupiza with the Argentine road, being built into Bolivian territory, joining Buenos Ayres and Tupiza. This will divert more of the Bolivian traffic from the Southern Railroad.

The La Paz-Tupiza road has been graded as far as Oruro, and track has been laid for about 80 miles. The other two roads will serve as feeders that will develop valuable mining districts and open up a rich rubber territory. The Oruro-Cochabamba line will be 133 miles long. The roadbed has been graded a few miles out from Oruro and work stopped pending a change of plans. The La Paz-Puerto Pando line will be 200 miles long. The stimulus these roads will give to the rubber and mining industries in a now almost inaccessible region will create an increase of traffic from Bolivia to the coast that will probably compensate the Peruvian railroad for the diversion of a portion of the business to Chilean and Argentine ports.

The government of Peru has adopted a policy aiming to stimulate railroad building. The state gives concessions or franchises for proposed lines, in some cases guaranteeing interest on investments and in others giving land grants as inducements. It also grants various other privileges such as free passage of railroad material through customs, cash bonus per mile of railroad built and guarantee of freedom from competition for a specified term of years. In order to insure being able to meet such obligations the proceeds of the tobacco tax, amounting to about \$1,000,000 yearly, have been set aside as railroad encouragement fund. The general railroad policy is to encourage roads into the Montaña from the two present trans-Andine roads to encourage a third trans-Andine road in northern Peru; to bring about a connection along the Cordillera between the two trans-Andine lines now in existence, and to connect some of the short roads that run from the coast ports into the valleys.

One of the hindrances to railroad operation in Peru is the high cost of fuel. The oil developments promise to lessen this somewhat. In the north of Peru oil fields are being worked and the government is commencing extensive prospecting work in fields that American consulting geologists have pronounced to be oil-bearing. On the Central Railroad of Peru it has been proposed to utilize the Rimac river in developing power and electrifying the road. Government engineers claim that the Rimac can develop 100,000 h.p. This is probably exaggerated, but there is no doubt of its being adequate to supply the demands of the railroad. Such an installation could also do considerable business in supplying power for the mining district that the railroad taps.

All roads that will be built running from trans-Andine roads into the Montaña have as their objective point a terminus on one of the navigable rivers flowing into the Amazon. Peru has 9,300 miles of navigable rivers in its eastern or Montaña territory. The Ucayali river alone flows north and south for almost the entire length of eastern Peru. Hence the roads into the Montaña have a network of water ways serving as feeders. Rubber companies receive large grants of land in return for opening up means of communication between the Montaña and the present railroads. One London company is making surveys now for a railroad from the Cuzco branch of the Southern Road to the Madre de Dios river. Another concession in force is from Huacho, on the coast, to the Cerro de Pasco road and thence east to the Ucayali river. The Peruvian government has made surveys for a third trans-Andine road to develop northern Peru. This will run from the port of Paíta through the town of Piura and what is claimed to be the lowest pass in the Andes to the port of Limon on the Marañon river. It is proposed to run this road over the mountains with electric power. Several other minor concessions are in force. Concessions are generally obtained upon depositing with the govern-



Mountain Scenery; Peruvian Central.

dillera of Peru and the towns of Arequipa, La Paz and the other small towns subsisting off the wool industry and farming. The westbound freight is largely mine products and wool. Rubber production in the Montaña bids fair to increase the traffic greatly as several important properties are being opened up. The present congestion of the traffic is shown by the fact that it generally takes a month to get a shipment through from Mollendo to Arequipa, a distance of 106 miles. The Cholo enginemen refuse to take night runs on account of the poor rails, heavy grades and sharp curves, so no trains are operated at night. Probably the congestion will be relieved when the roadbed is placed in good condition. Upon the completion of the railroad from Arica to La Paz, which the Chilean government has agreed to build according to the terms of a recent treaty with Bolivia, the Southern Railroad will have a severe competition for the La Paz business that it will find it hard to meet. The new line will be about 300 miles long and will afford direct communication with the coast. The distance from Mollendo to La Paz via the Southern Road and Lake Titicaca is 563 miles by water and rail, involving a transshipment at Puno. In addition the terminus of the Southern Railroad, at Mollendo, is probably the poorest harbor on the coast of Peru. A breakwater

ment a stipulated sum to serve as a guarantee of good faith and which passes to the state if promises of construction are not fulfilled.

One of the most important of the new propositions is the Peruvian Pacific Railroad, a line to run from the port of Chimboto to Recuay in the Huaylas valley. Recuay is 11,000 ft. above the sea level. The road will be 166 miles long. The concession includes valuable coal mines that can give an output of 130,000 tons per year. This will do much to cheapen railroad operation in Peru. The road will open up a good agricultural territory as well as a mining district.

The Ocean Carrier.

BY J. RUSSELL SMITH, PH.D.

V.

Recent Developments in Line Traffic.

The year 1870 may be put down as the fourth important date in the history of line traffic in modern commerce; 1816 was its real transatlantic beginning; the year 1840 had the first steamship line; 1850 marked the advance of steamship lines to economic independence as evidenced by their severe competition with each other and with the packet lines and by the carrying of steerage passengers. Eighteen hundred and seventy may be taken as a kind of focal date rather than as an exact date, marking the virtual disappearance of the packet lines and a great advance in steamer lines. It is true that there was at least one Atlantic sailing packet line running to New York as late as 1873 and one to Montreal in 1875, but 1870 may be safely taken as the date of their virtual disappearance—a process which had gone forward by great strides during the preceding decade.

The period central in 1870 and ending in 1873 was one of great prosperity throughout the commercial world. America was feverishly building railroads, transcontinental and otherwise. Europe was also on a boom and the response in ocean transportation was shown by the rapid establishment of new lines of the now thoroughly-proven ocean steamers.

We had new services to the Continent. In 1866, '67 and '68, the firm of Ruger Bros., of New York, established under different combinations line services to Bremen, and in 1869 they founded one to Copenhagen, Stettin and Christianssand, but all of these failed through the competition of the North German Lloyd. This strong company put on steam service from its home port to Baltimore in 1868, to New Orleans in 1869. In 1870 the Mississippi and Dominion Company started steamers from New Orleans to Liverpool. In 1868 the Boston & American Steamship Company started a steam service to Liverpool, but it did not survive many years.

In 1871 came the establishment of the American Line, running from Philadelphia to Liverpool in connection with the Pennsylvania Railroad. In 1872 there came a line from New York to Bristol, and the next year another from New York to Cardiff. In 1872 the Holland-America Line started its service from Amsterdam and Rotterdam to New York. In 1873 also the State Line was started between New York and Glasgow and the Red Star Line between Philadelphia and Antwerp. But the most significant and epoch making member of this group of new services was the White Star Line. The company back of this line had for several years been planning innovations and in 1871 they launched and sailed from Liverpool to New York their first steamer, the "Oceanic"—larger, longer, faster, more luxurious than anything afloat and with improvements in design that had to be copied in all passenger ships thence forward. Before that time the steamer had merely continued the practice of the sailors and the practice of the merchant ships of the ages. These vessels had put the crew in the fore-castle and more elegant quarters for captain, officers or passengers were erected in the stern of the ship. So in the steamer, but the White Star "Oceanic" ended all this for the better class passengers by appearing with cabins amidships where the motion in all directions is minimized in the same way that there is little motion in that part of a seesaw-board that rests on the fulcrum.

The period of prosperity and boom that was central in 1870 came to a sudden termination in the "crash" of 1873, the start of a long industrial depression which from 1874 to 1878 made great hardship and loss among ocean carriers. Here as on land many smaller and weaker companies disappeared and were absorbed by their stronger rivals.

From 1870 onward has been a period in which line traffic has had few if any epoch-making dates. It has proceeded gradually by improvements in kind of service rendered, in the number of lines and in the portion of the globe that they cover and connect.

In 1874 there was a strictly freight steamship line established between New York and Bristol. A predecessor in this direction had been the National Steam Navigation Company, which was formed in England during the Civil War to carry on trade with the South upon the return of peace. This was so long deferred that the company in 1863 opened service between Liverpool and New York with

their large slow steamers, which had been intended to carry on a trade which until that time was entirely served by sail. These steamers were devoted chiefly to freight and emigrants, a very small number of cabin passengers being carried. The strictly freight line of 1874 has since been multiplied until the number almost or quite equals that of the lines carrying passengers also.

The greater part of these strictly freight lines take their departure from the smaller ports where railroad and passenger accommodations are meager and where the distance to Europe is greater than from New York so that there is small reason for a passenger to desire the longer voyage. The steamship owners, therefore, find no inducement to cater to the few passengers whom they might get and whom they could scarcely carry at a profit. As a counterpart to that passengerless traffic, we have within the past 15 years had the freightless express steamers from New York in which the combined requirements of large crew and extensive bunkers and machinery for fast speed and large passenger accommodation have practically eliminated freight carrying.

In 1876 the same National Steam Navigation Company that gave so little attention to passengers was the first to carry fresh meat from America to Europe, and the next year they were also the pioneers in the transport of live cattle. Both of these improvements have been widely copied and have become important factors in ocean traffic. The refrigerated chamber has become of wide usefulness in carrying meat not only across the Atlantic, but practically around the world. For many years there have been lines of steamers devoted largely to carrying frozen meat to Great Britain from Argentine Republic, from Australia and from New Zealand. The artificially cooled chamber is also in use over the routes from Australia, South Africa and America to Europe for the transport of dairy produce and fresh fruits, and in all of these commodities the trade is growing rapidly.

In the period since 1870 connections have been established between the leading American ports and every European country of importance. In 1879 the Thingvalla Line from Copenhagen sent its ships to New York. French lines have come from Bordeaux and Marseilles. Spanish and Portuguese lines have been established. The Italian line has come, and in 1891 even the German Lloyd put on a New York-Italian service. Then came lines to the Adriatic and in 1899 to Constantinople.

This process of multiplication of lines went on so rapidly that by 1890 the port of New York alone had no less than 29 steamship lines to Europe, of which six ran express steamers, 23 carried both freight and passengers and six freight only.* Of these lines, 12 had sailings weekly or oftener and employed a total of 84 steamships.

The speed, frequency and excellence of the North Atlantic service centering at New York, but shared in no mean degree by Boston, Philadelphia, Portland, New Orleans and Galveston, partially explains why there are but a small total number of steamship connections between America and other parts of the world, and it has innocently helped to call forth many a bitter American lament because the best, the quickest and cheapest and the usual way to get from America to many parts of the world was via Europe. Typical of these laments is that of Senator Frye, of Maine, in his speech in the United States Senate, April 30 and May 1, 1884.

"A manufacturing concern in my city a few years ago undertook to sell cotton goods in Rio Janeiro. They forwarded them to New York, where they were shipped on an English steamer, carried to Liverpool, reshipped on another English steamer and carried in her to Rio Janeiro, and the mails went the same way."

After citing figures for Spanish-American trade and saying that England, France and Germany have nearly three-fourths of this trade, the Senator continued: "Why do these countries have three-fourths of all that immense trade in supplying these people and in taking supplies from them for their home market? For no assignable reason other than the fact that those countries have regularly established lines of steamers to the South American ports, speedy, prompt and reliable, while we have, comparatively speaking, none."

The answer to the Senator's eloquent lament is not far to seek. New York was then and is now the chief seaport assembling point, as was Liverpool, for the trade of a continent. These are great metropolises. Between them plies the very fastest and finest and most continuous ocean service. If you or your freight are anywhere near either of these ports, the quickest way to reach the other is to go to the nearest one and take the fast steamer for the other. It is just like the travel on land. Between New York and Philadelphia there is a magnificent passenger train service. Those cities are only 90 miles apart, but if a man lives 35 miles north of New York and desires to go to a place 35 miles north of Philadelphia he will probably find that the quickest and even the cheapest way for him to make the journey is to pass through both of the great cities and thus take advantage of the fast trains between them, and of the radial organization of local routes to each city, although this roundabout way nearly doubles the length of his journey.

In identical fashion the North Atlantic trunk route served as

*Scribner's Magazine, 9:411.

a magnet to draw to itself the trade between all parts of the old world and all parts of the new world, just as the trunk railroads between Philadelphia and New York command the travel of a hundred towns adjacent to each metropolis. Each metropolis has good connection with its hundred towns and with the other metropolis.

Similarly Europe and especially Liverpool has developed connections with all parts of the old world and incidentally with that part of the New World called South America. Europe was the pioneer in getting these services instead of the United States, because those ports of the world were her economic dependencies and she was dependent on them while America was not. Furthermore, these countries are all cultural dependencies of Europe, South America is Latin, South Africa and Australia are British, Asia is sprinkled with European possessions, and 25 years ago as now was a great European market. With emigrants, with mail, with colonial ambitions, with manufactured export and raw import, Europe had need of connection with the ends of the earth and where the need was the lines promptly came. Some of them were subsidized, but most of them were not.

In the meantime we did not have these strong needs to communicate with Africa, Asia, South America and the isles of the sea. We were showering wheat, corn, cotton and meat into Europe by the millions of tons. Manufactures came back over the route, with millions of European emigrants and hundreds of thousands of returning American tourists. Here, to meet these heaviest needs, arose the world's fastest steamship lines. By their connection at Liverpool, New York was but a little farther from Asia and Africa and South America than was Liverpool. In point of time, New York was often no farther away by this devious route than she would have been by a direct one because the small American demand for direct service would have sufficed only to command slow steamers. At the same time the livelier demand and the subsidies paid for connection from Europe had resulted in faster steamers from England, France and Germany, and these, connecting with the Atlantic racers, gave New York as speedy connection with the far corners of the seas as it was possible for her to have, unless her direct lines could be in receipt of other income than traffic earnings—namely, subsidies.

Nor was this roundabout connection necessarily an expensive connection. We still had the charter vessels, both steam and sail, in great numbers plying wherever there was demand for full cargo traffic, or wherever any merchant could load a ship as they were continually doing. It was only a comparatively small traffic, the traffic in manufactured goods that sought the route to market via Europe, and the freights were rarely high for the North Atlantic end of the trip. The steamers that carried the wheat, corn and cotton eastward were always half empty coming west across the Atlantic and the stray products of any non-European clime were gladly taken at a reasonable rate. It was furthermore often the case that the large New York passenger steamers were at certain seasons so pressed even for eastbound freight that they took it at low rates across to Liverpool or Hamburg or Antwerp, whence it could easily go anywhere.

An even more remarkable situation has arisen frequently in the recent export trade from New York. It has been cheaper for the American shipper to have his goods forwarded via Liverpool to Australia or Africa than it was for the Englishman to have his goods go out on the same steamer. This anomalous condition has resulted from rate wars on direct lines from New York at a time when there were no rate wars from Europe, and the trans-shipping lines have had to put the rate via Liverpool down to meet the direct rate from New York.

The trans-shipping of freight due to the excellence of the North Atlantic steamer lines is not a monopoly of Liverpool or of the ports on the European end. New York also has a share of the traffic to those parts of the world where New York's connections are superior to those of Europe, for then it is advantageous for European shippers to trans-ship at New York. The commercial bond between the North Atlantic ports of the United States and the Gulf, Caribbean and West Indian ports is stronger than that of those regions with Europe. We feed them and buy their produce, therefore we have more lines to them than Europe has, and the quickest and best way to and from many of these ports is via New York. As early as 1891 there were 18 lines of steamers with scores of vessels plying from New York to these waters, and European forwarders have for a decade been advertising the speed and excellence of the New York gateway for European goods to the West Indies, for they go as far as New York on the fastest carriers of freight. The backers of a British line to Colon complained of the hardship resulting from the fact that it was four days quicker from Colon via New York than by direct steamer.

In the period since 1890 there have grown up steamer lines, freight steamers in practically every case, between New York and all important quarters of the globe, to wit: The Orient, Australia, South Africa and South America, East and West.

Just when line traffic began with these regions it would be hard

to say. In practically every case it has come about gradually and at the hands of some firm that began as a mercantile house of the good old style of 1800. There have been a few large American merchant firms doing business in all these regions. They would load a sailing vessel back in 1850 or 1860 just as Girard did 50 years before and send her out to their agents or branch house at Valparaiso, Buenos Aires, Cape Town, Melbourne or Shanghai. Sometime later they would send another. They would occasionally take such freight as they could get for other shippers, and if trade was good there would be more vessels than when it was not good. When steam vessels became cheap enough to use, they were occasionally employed, and the despatchings of some firms that were dignified by the name of lines, in the prosperity of one year were not worthy of mention in the depression of the next. In 1891* the depression in Argentine Republic due to the Baring failure had disorganized the New York shipping trade. Before that Mr. Norton & Sons, of New York, and other firms had been sending from New York four to 12 steamers a year. They kept their services alive and for a decade have been running lines of slow chartered freight steamers.

The question of just what constitutes line traffic is not always easy to decide. In 1891 two New York firms were receiving about 25 steamers a year chiefly loaded with China and Japan tea. These same vessels went out to any port of the world to which their owners could be so fortunate as to charter them. At the same time Edward Perry & Co. were despatching about one steamer a month to East Asia. They had the habit of sending it when they got enough freight, and while the firm were freight carriers, they could scarcely be called the operators of a line, for a line has a schedule. The *Railroad Gazette* credits the first "line" to East Asia to the year 1899.

The connections between the United States and Australia are typical of the development above described. In 1853 two New York firms that had been despatching vessels for themselves and such others as desired to participate, agreed to take turns in sending out their sailing vessels. In 1878 a Boston firm began to send out sailing vessels regularly and in 1884 it began to alternate with the two New York firms. In 1890 a fourth company was added to the list of turn takers. In 1898 an English firm put on a line of steamers from New York outward, and the four American firms who had been sending sailing vessels only now united to form a rival steamship line. There soon came a third steamship line, European owned, and line traffic, on a modern basis but carrying freight only was thoroughly established.

The same decade, 1890-1900, that saw the phenomenal expansion of American exports and the establishment of line traffic to the Orient and to Australia also witnessed the establishment of two semi-merchant steamship lines from New York to the west coast of South America. During this same period also a transformation occurred in the South African trade identical with that which has just been described in the Australian trade.

The last few years in this decade were important ones in the establishment of steamer lines in the place of the old sailing vessels despatched occasionally. In 1899 the consolidated fleet of sailing vessels engaged in the American coasting trade around Cape Horn were sold and replaced by steamers which plied regularly in the long service between New York, San Francisco, Puget Sound and Hawaii until the opening of the Tehuantepec Railway in 1907, give them a more expeditious way of getting their freight from ocean to ocean.

The line traffic on the Pacific has had a more orderly and normal development than upon the Atlantic. It was well established to the Orient upon the opening of the first trans-continental railroad, and with the building of a new railroad line to each fresh port there has followed the establishment of a new steamship line to the Orient. These will be referred to more fully in the chapter on the railway steamship line.

The evolving ocean service has passed from the individual vessel, operated by its owner in the merchant carrier stage, to the common carrier with a world-embracing system. This evolution has been going on during the past century and it can also be seen to-day in all its stages. The trading schooner picks its way through Polynesia and along the shores of many half civilized lands. The private owner still fills his American coasting vessel, sometimes a steamer, with his own lumber and sends it off to market. The oil producer loads his own cargoes of oil in his own ships for export to foreign countries. A single firm in recent years has sent a full ship load of locomotives of its own manufacture half way round the world for delivery. The west South American and Australian trade of New York was, until recent years, carried on chiefly by merchants who loaded their own vessels;† sometimes filling them partly with the cargo of other shippers and sometimes entirely with a cargo of their own consignments. The cheapening of steam power

*Scribner's Magazine, 10:595.

†The fact that these vessels were often chartered, does not in any way affect the service.

since 1890 has caused the introduction of steamers on these routes between 1890 and 1900, and the original mercantile firms, which began years ago by sending out their own sailing vessels, turned to the running of lines of steamers. They are now being competed with in some cases by other lines which are public carriers only, and the continuance of the merchant as a carrier in these services is something of a relic in the world's commerce. In time it is likely to disappear here, as in Great Britain, before the more specialized organization in which the shipping firm devotes itself to the business of carrying, and leaves the mercantile operations to other firms. This specialization is the method of the larger commerce as we now see it in the trade between America and Europe. The same change is foreshadowed in these old-fashioned services, as shown in the recent reorganization of the New York-Australian carriers.

Each of four different merchant firms had been for years running sailing vessels to Australasia on its own account. When British steamship companies offered rival service as common carriers, the four firms united and formed a steamship company, also a common carrier. It would be easy for them to sell out the steamship business* and continue as merchants only, thus completing

British shipping: sailing vessels 7,227, steamships 8,147, and of the latter he estimated that 1,247 were liners and 6,900 tramps for hire. "Excepting the small Scandinavian fleets and a few continental firms the world tramp shipping is British * * * an investment of over £120,000,000 of genuine unwatered capital." * * * "They do the carriage not only of British and Colonial trade, but, so far as tramp shipping is concerned, 80 to 90 per cent. of foreign trade as well." "Silent and unseen and unknown of man they are really the backbone of our shipping business."† This statement implies that the German, French, Italian, Japanese and American merchant navies are largely devoted to line traffic. The sailing vessels were almost entirely in the charter class.

(To be continued.)

Derailment of a Standard Gage Train by Wind.

Readers of the accident record for the month of December, which was published in the *Railroad Gazette* of Jan. 24, page 109, will recall that one of the derailments, resulting in one death and six injuries, was caused by a severe wind storm. This was on the Colorado & Southern near Marshall, Colo., December 24. Four cars



Derailment of a Passenger Train by Wind Near Marshall, Colorado.

the advance of the common carrier for general traffic in this service, as it has been completed in so many before.

There yet exists along with all the services mentioned above a vast traffic of private character—the so-called tramp or charter traffic in which any individual, who so desires, loads a ship and sends her wherever his interests dictate. Thousands of vessels are hired by any one who can ship a full cargo. Such charter traffic is limited by this fact to cheap and bulky materials. It is also of declining importance in the greatest ports, because in these the line steamers suffice. But for small and out-of-the-way ports, shipping bulky raw produce, the charter or independent vessel will be an important factor for many decades to come. The vessel will in the majority of cases be hired for the particular cargo in question.

It is easy to let an account of the nineteenth century line traffic with its splendid developments cause one to underestimate the present importance of the unobtrusive, eighteenth century survival, the single chartered vessel—the sea beast of burden. According to Mr. Walter Runciman, Jr., M.P., a British ship owner of New Castle on Tyne, in a letter to the North of England Ship Owners' Association,† there were at the end of 1901 the following totals of

*The vessels themselves are chartered, but the business and good will are valuable.

†*Syren and Shipping*, July 8, 1903.

were overturned but the engine remained on the track. We give herewith two photographs showing the scene of this accident, from which it will be seen that it occurred in an open country a few miles from a range of high mountains. These mountains, which are seen in the extreme right of the upper view, seem to have had the effect of deflecting the wind so as to produce an exceptionally high velocity at the point of the derailment. The track, it will be seen, is in good condition; the rails are 80-lb., and the ballast and drainage good. That high winds are not uncommon in Colorado is evident enough from the somewhat numerous accidents of this kind which have occurred in past years to narrow gage trains, but this is the only accident of the kind, in recent years, to a standard gage train, so far as we recall. Marshall is 24 miles north of Denver and it is 5,410 ft. above the sea.

In Italy they are detailing soldiers to learn railroading. They are employed as brakemen, switchmen and in making up trains, and when sufficiently proficient receive a testimonial which entitles them to employment on the State Railroads when vacancies occur. A short road out of Rome is worked entirely by engineering troops.

‡Editorial in *Fairplay*, July 5, 1902, p. 886.

GENERAL NEWS SECTION

NOTES.

James C. Towers has been sentenced to imprisonment for life at Boulder, Mont., for murder and train robbery on the Northern Pacific, May 7, 1907.

On the Pennsylvania Lines West of Pittsburgh 159 grade crossings of streets and highways have been abolished within the past six years, mostly within cities.

The Missouri Supreme Court has declared unconstitutional the law of that state requiring railroads to give a free return pass to the shipper of each car of live stock.

The Chicago, Burlington & Quincy now uses telephones on its train wire between Aurora, Ill., and Galesburg, 129 miles (double-track). Gill's selector is used for calling the stations.

Chicago papers say that at the end of January many ticket speculators in that city vacated their offices, having concluded that under the recent sweeping decision of the United States Supreme Court it will be useless to try to continue their business.

The Wells-Fargo Express Company has appointed an industrial agent for the state of Texas, who is to confer with producers of vegetables and fruit in that state with a view of promoting their business in distant markets.

The estimate of the expenses of the New York State Public Service Commission, Second District, for the next fiscal year is \$262,000, which, however, the legislative committee does not feel certain will be the final maximum.

At the meeting of State Railroad Commissioners held at Oklahoma City last week a "Tri-State Commission" was organized, with J. E. Love, of the Oklahoma Commission, Chairman. This compound "commission" will meet in Galveston, Tex., April 16.

According to a press despatch from Louisville, the Louisville & Nashville announces that in consequence of the prohibitory law now in effect in Georgia and Alabama, the road will not receive shipments of intoxicating liquors to be carried into those states.

The Railway Commission of Canada, reviewing numerous reports of railroad accidents, urges railroads to take more precautions against the injury of employees in clearing up wrecks and in moving disabled engines. Men engaged in such work should perform their duties under the direction of a responsible foreman.

At the end of this week the Black Diamond Express trains of the Lehigh Valley between New York and Buffalo will be discontinued. The company hopes that the causes—adverse legislation, state and federal orders, increasing costs, dull business, etc.—will soon abate so as to permit the reinstatement of the trains.

The coastwise steamship lines carrying freight between North Atlantic and South Atlantic ports have announced uniform freight tariffs showing considerable increases. Southbound, classes one, two and three have been advanced two cents per 100 lbs. and classes four, five and six one cent per 100 lbs. Most of the commodity rates, which cover a large part of the heavier staple articles, remain unchanged.

Texas newspapers say that the Southern Pacific lines in that state will dismiss their "train agents." For the past two years 16 of these men have been employed, their duty being to take the place of the conductor in collecting tickets and fares. An officer of the road says that with the effective operation of the law forbidding the scalping of tickets, the work of the train agent will be less necessary than in the past.

The Trunk Lines announce that after March 1, a carload shipment will not be delivered at a number of different places, except on payment of an additional charge. It appears that carload shipments of provisions and other goods from the West are regularly brought to New York at carload rates and each car taken to a number of different steamship docks to be unloaded. It is proposed now to charge \$9 for each delivery after the first one.

The Interstate Commerce Commission, which has been asked by prominent railroad officers to suspend the operation of the law, which goes into effect March 4, limiting the hours of telegraph operators, is now being asked by many telegraphers to refuse any suspension. Over 1,700 telegrams from telegraphers were received in three days. A provision in the law empowers the Commission, after a full hearing in a case, to postpone the date on which a common carrier shall comply, but it is understood that the members of the Commission put on this proviso a very strict construction, holding, in effect, that before ordering a postponement, it

would be necessary to have a hearing in respect to each office affected.

The Attorney-General has this week begun suits covering 101 violations of the Safety Appliance Law, the railroads to be prosecuted and the number of violations charged against each being as follows: Atchison, Topeka & Santa Fe, 14; Baltimore & Ohio, 13; Baltimore & Ohio Southwestern, 1; Chicago, Burlington & Quincy, 4; Denver & Rio Grande, 13; Illinois Central and Y. & M. V., 2; Missouri Pacific, 5; Pennsylvania, 2; St. Louis Southwestern, 1; St. Louis & San Francisco, 3; Southern, 4; Southern Pacific, 17; Union Pacific, 2; Wabash, 4; Wabash Pittsburgh Terminal, 14.

William Coffin, Division Freight Agent of the Pennsylvania Railroad at Camden, N. J., has issued a booklet describing the business and industrial advantages of southern New Jersey, in which he offers to give all inquirers any desired information concerning commercial matters in that territory. During the past year 12,000 carloads of perishable freight have been shipped from southern New Jersey to other states over the West Jersey & Seashore, which is the principal part of the Pennsylvania system in that region. During the same time the West Jersey & Seashore carried from the farms 85,000,000 quarts of milk.

The Interstate Commerce Commission holds it to be a discrimination to permit anyone to ride on limited passenger trains between stations where passengers are not carried regularly, and that it is illegal to refuse to sell tickets to stations where such trains stop, unless the exceptions are plainly stated in the tariffs. The decision made was in case of a man who demanded a refund on a ticket he was compelled to buy over the Lake Shore from Chicago to Toledo. He was going only as far as Elkhart, but was made to pay through to Toledo, Elkhart not being a passenger stop. Such limitations must hereafter be shown in the posted tariffs.

Since the first of January the General Manager of the Pennsylvania Railroad, by issuing a suitable notice, has greatly reduced the volume of telegrams sent over the company's wires, the reduction at the main telegraph office of the railroad company in Broad Street Station, Philadelphia, amounting to an average of 1,500 messages a day for the month of January. It is about four years since a similar shrinkage was produced, by a similar order, the reduction in numbers having been somewhat larger then than now. Like the issuing of passes, the writing of telegrams would seem to be a matter which can be kept within satisfactory bounds only by repeatedly "jacking up" the persons responsible.

The special session of the North Carolina Legislature, called to consider the passenger rate question, adjourned on Saturday last. A bill was passed providing for a rate of 2½ cents a mile and, so far as appears from the press despatch, there are no exceptions to this, although, presumably, the law takes into account the proposition, which was made by the Southern Railway, to sell mileage tickets at rates less than 2½ cents. A proposal to delegate extensive authority in this matter to the State Corporation Commission was not adopted, and a resolution was passed expressing the hope that, with the higher passenger rates now permitted, the roads would not find it necessary to reduce the wages of their employees.

Arica-La Paz Railroad.

The Chilean Government has given a German bank and a German firm a \$15,000,000 contract for building the Arica-La Paz Railroad. The line will run from Arica, the most northern port of any consequence in Chile, to La Paz, the capital of Bolivia, about 335 miles. It is to be completed within four years. The government is to provide the right of way and to admit free all material and machinery used in building the road. It is understood that the only interest the bank has in the matter is that it takes the government 5 per cent. bonds that are to be issued to pay for the road. It is to be built in accordance with the treaty made with Bolivia on March 21, 1905, when Chile took over that portion of Bolivia that bordered on the Pacific ocean. The address of the contractor is on record at the Bureau of Manufactures, Washington, D. C.—*Consular Report*.

Terms of a Recent Railroad Pool in England.

The consolidation of two English railroads, the Great Central and the Great Northern, under a joint committee composed of the boards of directors of the two companies, was described in the *Railroad Gazette* of January 17, 1908, page 75. Further particulars of this consolidation have been issued to the shareholders of the two companies. With the exception of the Lancashire, Derbyshire & East Coast and the Sheffield District Railway, the undertakings

of the two companies are to be worked and maintained by the joint committee. Out of the net receipts for each year, after allowing to each company interest at the rate of $3\frac{1}{2}$ per cent, a year on the authorized capital issued and to be issued, the joint committee is to pay \$19,016,660 (£3,803,332) to the two companies in the proportion of 47 per cent. to the Great Northern and 43 per cent. to the Great Central. These are the ratio proportions of their net receipts for the year 1906 to the earnings of both for that year. Out of the balance of the net receipts, if sufficient, the Great Central is to be allowed \$500,000 (£100,000) for new capital expenditures. Any net receipts remaining are to be divided between the two companies in the following proportions: Down to and including the year 1910, 57 per cent. to the Great Northern and 43 per cent. to the Great Central. After the year 1910 and down to and including the year 1912, $56\frac{1}{2}$ per cent. to the Great Northern and $43\frac{1}{2}$ per cent. to the Great Central. After the year 1912, 56 per cent. to the Great Northern and 44 per cent. to the Great Central.

Motive Power Apprentices; New York Central.

The following extracts are from an address by J. F. Deems at the annual dinner of the National Society for the Promotion of Industrial Education:

"On March 6, 1906, the present apprentice system was organized on the New York Central Lines. Its object is to provide for the motive power department an adequate recruiting system which will eventually produce from the ranks a large number of skilled workmen, a number of foremen, a sufficient number of good draftsmen, a few master mechanics, and an occasional superintendent of motive power. The interest of the railroad is identical with that of the apprentices in that the better all around training the boy receives, the more valuable he becomes to the railroad. The course of training has been outlined with the intent to educate the boy in the trade and not out of it. The general plan is two-fold and provides for shop instruction of the apprentice in the trade and for his instruction in educational subjects allied to his trade during working hours while under pay. The plan is now in operation at the 10 larger shops and already includes over 500 apprentices. The work is so arranged that each apprentice may go as rapidly or as slowly as his ability will allow. All principles are handled through shop problems and must have practical bearing. We are somewhat handicapped by the lack of text-books for apprentice instruction, as the literature of such instruction has yet to be written. Classes are held from 7 to 9 o'clock in the morning each apprentice reporting for two mornings per week. The immediate and direct results of the system have been: Increased output (notwithstanding the four hours per week spent in class), less spoiled work, ability to read drawings, to lay out templates and to make sketches, a better grade of apprentices, increased interest in the work, suggestions as to improved methods and tools, draftsmen for company drafting rooms and apprentices for special work as needed. The officials of our railroad are already enthusiastic over the results obtained in these courses."

Fire Dangers on Underground Electric Railroads.

On one of the motor cars of the District underground railway in London on January 8 at Sloane Square Station there was an explosion and electric flashing. The Board of Trade made an examination and on January 17 issued a report on this accident, whose conclusions may be summed up as follows, the reference being to a correspondence which had been going on in the daily press: "The apprehensions of danger expressed by the writers . . . are not justified by the facts. The main danger in any such cases of fire will be from panic. For this reason we deprecate the writing for publication of alarmist letters." This report is signed by Major Pringle and A. P. Trotter, Electrical Adviser, of the Board of Trade.

It was found that above floor level there was some blistering of the varnish on the woodwork around a window and doorway and that two panes of glass were blackened with smoke and fumes. No glass was broken. When the blistering and the smoke was rubbed off, the red paint work underneath was undamaged.

Below floor level the metal pipe carrying the electric light wires and a metal junction box was fused. The under side of the timber flooring just above this pipe and junction box were charred in places, but nowhere deeper than one-quarter of an inch. Inside the car no mark of fire was visible on the flooring, seats or sides. All woodwork in proximity to electric conductors on these cars is non-inflammable. This wood will char under the effect of intense heat from electric flashing, but will not catch fire. "The real combustibles, if we may use the word," the inspectors say, "in this fire were copper, iron and brass." Such electric arcs continue until burnt out or exhausted or until the current is cut off, as happened in this case. The ordinary method of extinguishing a fire is useless for electric arcs.

The cause of this explosion was probably the failure of the in-

sulation on the electric light wires owing to damp. The heating of the wires resulted in the liquefaction of a small block of bitumen; an explosion of bitumen vapor followed causing smoke and fumes. Subsequently there was electric flashing along the pipe and at the junction box under the car.

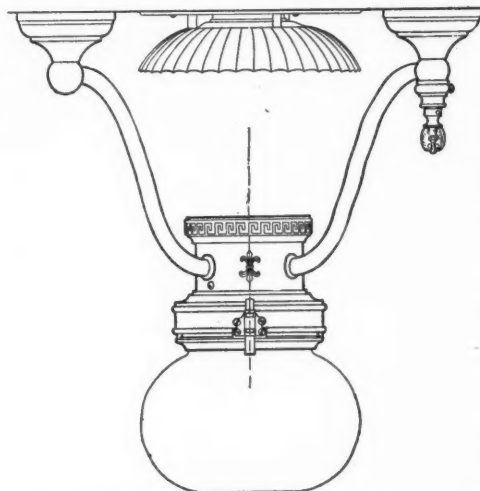
There was no difficulty at all with the center doors and the eight passengers stepped out on the platform without apparent alarm. No complaint of injury or danger was made to any railroad officer.

The Government and the Block System.

When a certain churchman of high rank, after the execution of Anne Boleyn, ventured to remonstrate with Henry VIII., the much-married King of England, for sending his wives to the headsman at the Tower, the King merely smiled pleasantly and assured the ecclesiastic that his point was not well taken, and for reasons that he would at once make clear. "You see, Your Eminence," said Henry, leaning back on the comfortable cushions of his throne and twirling his thumbs reflectively, "you see, when a man runs his matrimonial train in several sections upon a single track, as I do, the safety of the public requires that we shall adopt the block system."—*Harper's Magazine.*

Pintsch Mantle Lamps.

The Safety Car Heating & Lighting Co., New York, has just installed 8,000 of its latest type of single mantle lamps on cars of the Canadian Pacific. This type of mantle lamp, No. 3500, which is shown in the accompanying illustration, is the one introduced some months since. In tests made by J. E. Denton, Professor of Engineering Practice at Stevens Institute of Technology, the hourly consumption of Pintsch gas was found to be 2.12 cu. ft. per hour, giving 99.5 candle power at a cost of 1 cent an hour. When the company introduced the four-mantle or multiple mantle lamp, it was pointed out



Pintsch Single Mantle Lamp.

that such repair parts as the mica chimneys, cup reflectors, ring reflectors, clusters, cluster stems and domes, as used in the four-flame lamps, would be eliminated. With the same consumption of gas, the candle power was increased three times. Now, with the introduction of the single mantles, the same candle power is maintained, the consumption of gas decreased one-third and the necessary maintenance of mantles reduced 75 per

cent. While the life of the single mantle was estimated at three months of actual service, it has really averaged four months.

In conjunction with the equipment of the Canadian Pacific cars, the Pintsch Compressing Co., New York, has also installed Pintsch gas plants at Vancouver, B. C., Moose Jaw, Sask., and Winnipeg, Man., and has arranged for charging facilities on the Canadian Pacific in conjunction with its plants at Montreal, Que., and Toronto, Ont. Plants are now located at 78 places in the United States and Canada, and there is also one at Mexico City, Mex. At Chicago, gas can be supplied to 25 roads; at Cincinnati, Ohio, to 14; at Kansas City, Mo., to 15; at St. Louis, Mo., to 18, and at the other points to from one to 12 roads. The company has published an interesting map showing the roads using Pintsch light, the supply stations being also indicated.

Radical Reforms.

For a prompt and simple solution of the transit problem, commend us to Assemblyman Cuvillier. He introduced on January 22 a truly epoch-making measure, which requires "that all trains, owned, leased, operated or controlled by the New York Central & Hudson River Railroad Company, the West Shore Railway, the Harlem Railway Company and the Putnam Division of the Harlem Railway Company, and the New York, New Haven & Hartford Railway Company shall, after the passage of this act, stop each and every train at the station now established at Park avenue and 125th street, within the state of New York, borough of Manhattan, for the purpose of receiving and discharging passengers."

For the theory of this measure we have only praise and wonder-

ment, but we can, nevertheless, offer a few humble suggestions. For example, if it is practicable to make the West Shore trains traverse a river and four miles or so of intervening house-tops in order to stop at the 125th street station, too much speed cannot be made in ordering the Lackawanna trains to stop, say, at the Fulton street station of the subway, and the Erie trains at Wall street. On the other hand, considerations of fairness would suggest some trifling exemptions. It is unreasonable, we think, to require, as Mr. Cuvillier's bill does, all trains running between Boston and Providence, or between Rochester and Syracuse, to call at the Harlem station. However, these are minor points, and perhaps it is as well to make the railroads do as much for us as possible. The main thing is that we are wasting money on Public Service Commission and new traction lines when we have statesmen who, like Mr. Cuvillier, can make all these appear superfluous.—*New York Evening Post.*

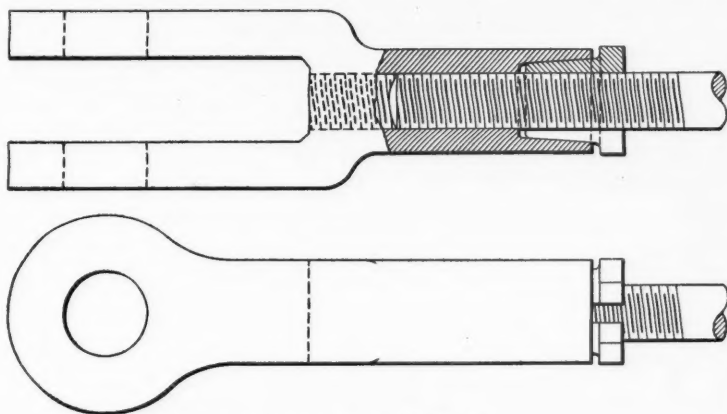
Wages in South America.

The last annual report of the Buenos Ayres Great Southern gives the following comparison of average weekly wages paid on Argentine and English railroads:

	Argentine.	England.
Enginemen	\$16.10 to \$23.25	\$6.90 to \$10.20
Firemen	9.70 " 14.15	5.10 " 6.55
Guards	\$9.70	4.85 " 7.30
Switchmen	5.80 to 7.30	3.60 " 6.80

The Hillman Locked Clevis.

A patent has been granted to E. D. Hillman, M.E., for an adjustable clevis that can be locked at any desired position. The accompanying drawing shows clearly the locking device, which consists of a conical split nut fitting into a conical recess in the stem of the clevis. When the clevis has been properly adjusted, the nut is



Hillman Locked Clevis.

screwed into the recess of the shank until the threads of the rod and nut and the sides of the nut and recess bind. The locking feature can be used in either drop forged, malleable iron or steel clevises. Standard clevises can be treated in the same manner. This device should be of value wherever adjustments are necessary, such as in brake-gear, switch and signal work, cranes, bridges and various rigging. It will be put on the market by the U. S. Metal and Manufacturing Co., New York.

Paint Tests.

The Paint Manufacturers' Association, Chicago, has been arranging for a series of paint tests to extend over five years. Some of the tests are to be made at the Carnegie Technical Schools, Pittsburgh, Pa., where committees of the association and of the faculty will test 232 mixtures to establish standard formulae.

English Electric Railroads.

The London & North Western has announced that its proposed electric line to connect Euston with Watford, for which Parliamentary approval has been granted, will not be built at present owing to the financial situation. This line is to cost between \$13,000,000 and \$15,000,000 and is to give relief to the main line and a better suburban service to Watford, partly by a subway. During the last year or two there has been little street railway construction work done in the United Kingdom except the underground trolley system of the London County Council, one or two lines on the surface contact stud system and extensions of some of the more important tramway systems. It was hoped that electrical manufacturers would receive enough work from steam railroad electrification to make up for the lack of street railway work, but they have not. What is described as the first single-phase electric line in Eng-

land is nearly finished. This is a section of the Midland Railway from Morecambe via Lancaster, to Heysham. The London, Brighton & South Coast single-phase line, between London bridge and Victoria, a large undertaking altogether, is not yet anywhere nearly finished.

Electrical Exhibition at Marseilles.

An "International Exhibition of the Applications of Electricity" is to be held at Marseilles in the south of France from April 19 to Oct. 31, 1908. Marseilles, whose population is more than 500,000, has now an elaborate system of distribution of electrical energy. The entire South-East district of France also, which has hitherto received its electrical supply from a few small power stations, will now have the advantages of a great system of distribution by a series of hydro-electric generating stations, which, when completed, with reserve stations, will have a total capacity of 150,000 h.p. A territory with a population of over 3,000,000 is, or shortly will be, thus supplied with electricity and open to all branches of electrical industry. The object of the exhibition is to bring the numerous possible applications of electricity to the attention of the public and to establish new commercial relations for electrical manufacturers in this territory. The exhibition will comprise the following sections:

1. Transmission and Distribution of Electrical Energy;
2. Applications of Electricity to Industries in general;
3. Applications of Electricity to Domestic Industries;
4. Applications to Domestic Economy;
5. Applications to Public and Private Lighting;
6. Applications to Heating and Ventilation;
7. Applications to Machinery for Lifting and Manipulation;
8. Applications to Mines and Quarries;
9. Applications to Traction;
10. Applications to Agriculture;
11. Applications to Military and Naval Engineering;
12. Electro-chemistry, Electro-metallurgy and the Allied Sciences;
13. Telegraphy and Telephony;
14. Applications to the Medical and Surgical Sciences;
15. Electrical Instruments for Measurement and Calibration;
16. Raw Materials and Manufacturers used in Electrical Industries;
17. Practical and Theoretical Teaching of the Science of Electricity.

A special corps of engineers under the direction of the General Commissioner will take charge of the erection, repair, maintenance and proper working of the exhibits, as well as their packing and return shipment, at the close, and if desired the commercial interests of those exhibitors who are unable to be present. Paul Dieny, Park Row building, New York, is the Commissioner for the United States.

Resolutions on Forest Preservation.

The Board of Directors of the American Institute of Electrical Engineers adopted the following resolutions on January 10:

Whereas, The American Institute of Electrical Engineers recognizes that water powers are of great and rapidly increasing importance to the community at large, and particularly to the engineering interests of the country; and,

Whereas, The value of water powers is determined in great measure by regularity of flow of streams, which regularity is seriously impaired by the removal of forest cover at the headwaters with the resulting diminution in the natural storage capacity of the watersheds, this impairment frequently being permanent because of the impossibility of reforestation, owing to the destruction of essential elements of the soil by fire and its loss by erosion; therefore

Be it Resolved, That it is the opinion of the American Institute of Electrical Engineers that the attention of the national and state governments should be called to the importance of taking such immediate action as may be necessary to protect the headwaters of important streams from deforestation, and to secure through the introduction of scientific forestry and the elimination of forest fires the perpetuation of a timber supply; and further

Be it Resolved, That the Committee on Forest Preservation be instructed to communicate these resolutions to all members of Congress and to the governors of all the states.

A 25,000-H.P. Rolling Mill Engine.

The Allis-Chalmers Co., Milwaukee, Wis., has shipped to the Carnegie Steel Co., Sharon, Pa., a monster rolling mill engine of over 25,000 h.p. capacity and weighing more than 1,250,000 lbs. Two of the castings weighed 118 tons each after machining, and other parts are in proportion. The heavier parts were shipped on special, reinforced 100-ton cars. The engine is horizontal, twin-tandem, with cylinders 42 in. and 70 in. x 54 in. It runs condensing at 175 lbs. steam pressure and a speed of 150 to 200 r.p.m. In spite of its size and power, it is easily controlled and needs only one engineer. The character of service requires quick reversal at the end of each run of the rolls, and the load varies quickly from nothing to maximum. The reversing mechanism is of the Reynolds-Marshall type, run by a small independent engine with oil cylinder lock, and another small engine works the throttle valves. All these units are under the control of the engineer. The engine can be reversed in a few seconds.

This company is also building 12 gas-engine-driven blowers for

the Carnegie Steel Co.'s Homestead plant and the new works of the Indiana Steel Co. at Gary, Ind. It built large vertical steam-blowing engines recently for the Northwestern Iron Co., Mayville, Wis., and other prominent plants, and has on its erecting floor engines of this type for the Wickwire Steel Co., the Tonawanda Iron & Steel Co., the Pennsylvania Iron & Steel Co. and the Republic Iron & Steel Co. Between three and four hundred Allis-Chalmers vertical steam-driven blowing engines, and nearly as many more of the horizontal type, are in service at various iron and steel producing centers of the country.

Advance in Freight Rates in Mexico.

Consul W. D. Shaughnessy states that increases are to be made in freight rates on the Mexican railroads, averaging, on specified commodities, about 12 per cent. The railroads desired average increases of about 20 per cent., but the government commission reduced this. Included under special tariffs are commodities like coal, coke, lumber, grains, sugar, ores, etc., which form the bulk of the freight moved by the railroads. The matter of the classification of ores and the revision of the special tariffs covering ores has been referred to a sub-committee for consideration. It is calculated that these increases will result in the material enlargement of the revenues of the railroads and provide them with the funds for the construction of needed improvements. The railroads have insisted that increases in rates are necessary, for the reason that the cost of labor and of materials has increased from 60 to 150 per cent. since the revision of rates in 1900.

Tug Takes 11,616-Mile Journey.

The newspapers announce the arrival at Panama of the "Catherine Moran," a 154-ton tug, 90 ft. long. Needing a new tug for service at Panama, the Canal Commission bought the vessel from the Moran Towing Company, of New York, and on October 26 it started on its trip. The course was laid close to land, but followed, in the main, the route laid out for the battleship fleet now making its way to the Straits of Magellan. A stop was made at one southern port before the tug entered the Gulf of Mexico, and it touched at six other places for coal and other supplies. A total of 11,616 miles was traversed at 9.13 knots, an average of 219.6 knots a day. The tug burned on the voyage 601 tons of coal.

Annual Dinner of the American Institute of Electrical Engineers.

The annual dinner of the American Institute of Electrical Engineers will be held at the Waldorf-Astoria, New York, on the evening of Wednesday, February 19, at 7 o'clock. As on former occasions, the speeches this year will be on the relation of the electrical engineer to public service corporations. It is called the "Public Service Dinner," and among the speakers who have promised responses to toasts are many men prominently identified with public utilities, either as members of commissions or operating heads of large organizations. The price of the dinner will be \$5, not including wine or cigars. As usual, ladies will be present. Guests will be seated at small tables accommodating eight persons. The dinner committee is composed of Robert T. Lozier, Chairman; A. A. Gray, Frederick C. Bates and George H. Guy.

INTERSTATE COMMERCE COMMISSION RULINGS.

Import Rules on Plate Glass Upheld.

The Commission, in an opinion by Commissioner Clements, has announced decision in the two cases of Pittsburgh Plate Glass Co. v. Pittsburgh, Cincinnati, Chicago & St. Louis et al., and of the same complainant against the Illinois Central. The complaints in these cases alleged unjust discrimination in rates against domestic shippers of plate glass in favor of import shipments, because the rates of the former are relatively higher than the inland rail proportion of the total charge from the point of origin in a foreign country; but the Commission held that under the law as interpreted by the United States Supreme Court in the Import Rate case the Commission cannot consider such disparity in rates alone as constituting unjust discrimination.

Further findings of the Commission were as follows:

In considering the question of alleged unjust discrimination in favor of shippers of import plate glass moving from the ports of entry in this and adjacent foreign countries to interior American destinations, and against domestic shipments between points in the United States, it is the duty of the Commission to look to the circumstances and conditions affecting the matters involved, not only in this country, but in the entire field of commerce here and abroad. It is well settled by the highest judicial authority that the existence and effectiveness of competition between carriers, whether by rail or water, whether subject to the Rate Law or not; and competition of markets, or the absence of such competition, are, among other things, pertinent to the question of similarity of circumstances and conditions, and as to whether the discrimination complained of and shown is or is not undue or unreasonable.

To make the total through charge from a foreign port of origin the

absolute measure of the rate to be charged on domestic traffic from the port of entry in this country through which the import shipment moves, would be to establish a hard and fast rule difficult if not impossible for the rail carriers in this country to conform to in the establishment and publication of their rates, in view of that uncertain and flexible element involved in the ascertainment of the total through charges, to wit, ocean rates.

Discriminations of the nature referred to in sections 3 and 4 of the Rate Law, in so far as they result from the *bona fide* action of a carrier in meeting circumstances and conditions not of its own creation, and which are reasonably necessary for that purpose, do not of necessity fall under the condemnation of the law.

Transportation from a seaport of the United States or an adjacent foreign country to an interior American destination, in completion of a through movement of freight from a point in a foreign but not adjacent country, whether on a joint through rate or on a separately established or proportional inland rate applicable only to imports moving through, is not a "like service" to the transportation of traffic starting at such domestic port, though bound for the same destination.

As held in numerous decisions of the Supreme Court, it is neither required by law nor just, that the rates of a carrier on traffic subject to intense competition shall mark the measure or limit of its rates on traffic not subject to such competition. Being bound to consider the more intense competition to which the transportation of the foreign product is subject as one of the "circumstances and conditions" affecting the relative adjustment of rates, the Commission cannot, solely upon the basis afforded by a comparison of the inland proportion of the through rate from the foreign port of origin with the rate applying on domestic shipments of plate glass in this country, condemn the latter as unreasonable or unjustly discriminatory. As rates applying on domestic shipments of plate glass between points in this country were challenged mainly on the ground of unjust discrimination and not on account of their unreasonableness *per se*, and as there is no basis in the record of the case as presented for a determination as to whether these rates are or are not just and reasonable of themselves, the complaint is dismissed without prejudice.

The complaints were dismissed.

TRADE CATALOGUES.

Motor Starting Devices.—Bulletin No. 4559 of the General Electric Co., Schenectady, N. Y., describes d.c. motor starting rheostats and panels. Rheostats with no-voltage release and those with both no-voltage and overload release are illustrated and described, as well as rheostats for starting reversible shunt or compound wound constant speed motors. The bulletin also shows a variety of panels in which different types of starting rheostats are used. Dimension diagrams for different capacities of rheostats and panels are included.

Shay Geared and Rod Locomotives.—The Lima Locomotive & Machine Co., Lima, Ohio, has issued catalogue No. 15. This company makes the Shay geared locomotive and also direct-connected or rod locomotives. Illustrations of the different classes are shown and the principal dimensions and hauling capacities of the different sizes given. The standard specifications for the construction of the locomotives are printed and there is also some useful information on the last pages. Besides locomotives, the company builds logging cars.

Springs.—The Standard Steel Works, Philadelphia, Pa., has published an illustrated catalogue showing types of steam railroad and electric railway springs. These include semi-elliptic springs, single and multiple full elliptic springs, coil, draft, bolster and other springs. Specimen dimension sheets are reproduced on which specifications may be conveniently made when ordering springs.

Heaters.—The Consolidated Car Heating Co., New York, is distributing a circular showing its new vestibule heaters. They are made both stationary and portable and are designed for motormen's vestibules in electric cars and for small ticket offices or other places where but little heat is required. The standard type is arranged for 1½ amperes at 600 volts, consuming 900 watts.

Corliss Engines.—The Murray Iron Works Co., Burlington, Iowa, is distributing a pamphlet giving the nomenclature of Murray Corliss engines. It consists of half-tones and line drawings of different assembled engines and parts, the names of the latter being indicated on the drawings. The nomenclature is quite full, no part being overlooked.

Bolsters.—Part catalogue No. 4 of the Gould Coupler Co., New York, is devoted to the company's Crown type body and truck bolsters. It is illustrated with half-tones and working drawings showing separate bolsters and the body bolster with draft gear applied.

Variable Speed Motors.—The Northern Electrical Manufacturing Co., Madison, Wis., has issued booklet No. 54, discussing variable speed motors and advocating the single voltage shunt field control, which is the system used by the company.

Acetylene Lights.—The Alexander Milburn Co., Baltimore, Md., has issued an illustrated catalogue and price list of several types

of portable acetylene lights for different kinds of service. A list of agencies and customers is included. One of these lights was described in the *Railroad Gazette* of January 24, 1908.

MANUFACTURING AND BUSINESS.

The Hess-Bright Manufacturing Co., Philadelphia, Pa., intends to occupy within six weeks a four-story building, with a floor space of 15,000 sq. ft., at Twenty-first street and Fairmount avenue.

The United States Steel Corporation announced on Tuesday that the 25,000 shares of preferred stock offered to employees under the profit sharing plan of 1908 at \$87.50 a share have been largely over subscribed.

Raymond D. Carter, formerly Managing Editor of the *Newark Morning Star*, has been appointed General Advertising Agent of the Central Railroad of New Jersey and Editor of its monthly magazine, *The Suburbanite*; office at 143 Liberty street, New York.

H. W. Nutt, who for the past year has represented Buell & Mitchell, New York, in Boston, Mass., has been appointed District Manager for the New England states of the General Fireproofing Co., Youngstown, Ohio, with office at 161 Devonshire street, Boston. Mr. Nutt had previously been Assistant General Sales Agent of the American Steel Hoop Co. (now merged in the Carnegie Steel Co., Pittsburgh, Pa.), Secretary of the American Tube & Stamping Co., Bridgeport, Conn., and Vice-President of the Superior Steel Co., Pittsburgh, Pa.

Iron and Steel.

According to press despatches, British mills have made contracts for 17,000 tons of rails for shipment to Africa and 14,000 tons for Australia.

The New York Central & Hudson River is asking bids, under revised specifications, on 3,500 tons of structural steel for the north-east corner of the new station building at the Grand Central terminal, New York.

The United States Steel Corporation has an inquiry for a large tonnage of rails from an important road for early delivery. The Pittsburgh & Lake Erie is believed also to be in the market for several thousand tons.

Judge Gary, of the United States Steel Corporation, announced last Tuesday that the rail manufacturers and many of the railroads had reached a satisfactory agreement on rail specifications. The new specifications provide, he said, for a heavier rail with improved section and with the practice in manufacture somewhat improved. The additional cost of the new rails, if any, is to be paid by the purchasers.

MEETINGS AND ANNOUNCEMENTS.

For dates of conventions and regular meetings of railroad conventions and engineering societies, etc., see advertising page 24.)

American Society of Civil Engineers.

At the meeting of this society held February 5, there was a paper on Overhead Construction for High Tension Electric Traction or Transmission by R. D. Coombs; also one on A New Suspension for the Contact Wires of Electric Railways Using Sliding Bows, by Joseph Mayer. Both of these papers were printed in the proceedings for December, 1907.

ELECTIONS AND APPOINTMENTS.

Operating Officers.

Canadian Northern.—A. Wilcox has been appointed Superintendent at Port Arthur, Ont., in place of J. R. Cameron, promoted.

Canadian Pacific.—J. Brownlee, hitherto Superintendent of the Moose Jaw division, has been appointed Superintendent of the Cranbrook division, in place of John Erickson. Allan Purvis, heretofore Chief Clerk to the General Superintendent of the Pacific division, has been appointed Superintendent of the Kootenay line, with headquarters at Nelson, B. C.

International & Great Northern.—Henry Martin has been appointed Superintendent of the Fort Worth division in place of C. Hightower, resigned; office at Mart, Tex.

Effective Feb. 1, the office of Assistant General Manager is abolished.

Southern.—J. F. Hays has been appointed Manager of the line between Hendersonville and Lake Toxaway (Transylvania Railroad), with office at Brevard, N. C.

Wisconsin Central.—F. M. Gates, Chief Clerk in the car service department, has been appointed Car Service Agent, relieving P. W. Drew. Mr. Drew continues as Superintendent of Telegraph.

Traffic Officers.

International & Great Northern.—N. M. Leach has been appointed General Freight Agent in place of G. H. Turner, resigned.

Engineering and Rolling Stock Officers.

International & Great Northern.—J. F. Enright has been appointed Superintendent of Machinery, with headquarters at Palestine, Tex. The office of General Master Mechanic has been abolished.

Southern.—The master mechanics of the Atlanta, Birmingham, Knoxville and Selma divisions have been ordered to be transferred as follows: Master Mechanic John F. Sheahan, of the Atlanta division, to be transferred to Knoxville; Master Mechanic J. B. Michael, of the Knoxville division, to be transferred to Selma; Master Mechanic G. Akans, of the Selma division, to be transferred to Birmingham; Master Mechanic N. N. Boyden, of the Birmingham division, to be transferred to Atlanta.

Union Pacific.—Charles E. Fuller, late Superintendent of Motive Power of the Chicago & Alton, has been appointed Assistant Superintendent of Motive Power of the Union Pacific; office at Omaha, Neb.

CAR BUILDING.

The Woodward Iron Co., Birmingham, Ala., has ordered 40 all-steel hopper cars of 100,000 lbs. capacity.

The National Car Line, Chicago, has ordered 10 tank cars of 60,000 lbs. capacity from the Bettendorf Axle Co.

The Grand Trunk Pacific has ordered 2,400 freight cars from the Canada Car Co. and 500 freight cars from Rhodes, Curry & Co.

The Republic Creosoting Co., Indianapolis, Ind., has ordered five 8,000-gal. and one 10,000-gal. tank cars from the McGuire, Cummings Manufacturing Co. These cars will be 31 ft. 6 in. long and 8 ft. 6 in. wide. The special equipment includes:

Bolsters	Monarch
Brake-beams	Monarch
Couplers	Monitor
Draft rigging	Cardwell

RAILROAD STRUCTURES.

BUTLER, PA.—The city council has under consideration a proposition of the Baltimore & Ohio to replace the wooden overhead bridge on Lookout avenue with a steel structure, 27 ft. wide and 57 ft. long.

CLEVELAND, OHIO.—The Pennsylvania freight house on the lake-front was recently destroyed by fire.

EDMONTON, ALB.—An understanding, it is said, has been arrived at between the city of Edmonton, town of Strathcona, province of Alberta, and the Canadian Pacific regarding a high level bridge to be built by the railroad here, at a cost of about \$700,000. Bids for the work, it is said, will be asked for at once.

FORT WILLIAM, ONT.—The McKay & Kakabeka Falls Railway is planning to cross the Canadian Pacific, Canadian Northern and Grand Trunk Pacific tracks at West Fort and the Canadian Pacific tracks in Fort William by overhead bridges or subways.

NEW YORK, N. Y.—The New York, New Haven & Hartford has filed plans for putting up four new passenger stations in the Borough of the Bronx on its Harlem River branch, at a total cost of \$190,000.

PRINCE RUPERT, B. C.—It is reported that the Grand Trunk Pacific is arranging preliminaries for the construction of a great hotel.

RENNIE, MAN.—Contract is reported let to S. C. Hill & Co. for putting up two trestle bridges near Cross Lake for the Grand Trunk Pacific. The larger trestle is to have 75 spans and the other 31 spans.

SACRAMENTO, CAL.—The Western Pacific, it is said, will build its main shops here.

TORONTO, ONT.—It is thought that City Engineer Rust will be instructed to prepare plans for a street railway bridge over the western gap at Queen's wharf to cost \$60,000.

WASHINGTON, PA.—At a joint meeting of the Commissioners of Washington and Westmoreland counties in Pittsburgh, the contract for the proposed bridge over the Monongahela river between Donora, in Washington county, and Webster, in Westmoreland county, was let to the Toledo-Massillon Company, who offered to do the work for \$189,000.

WINNIPEG, MAN.—William Mackenzie, President of the Canadian Northern, is quoted as saying that bids will be asked for early this year to build the proposed union station and hotel here.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATLANTIC, QUEBEC & WESTERN.—This company, which has finished its line from New Carlisle, Que., north to Port Daniel, about 20 miles, has given a contract to the New Canadian Co., Ltd., of Paspebiac, and work is under way from mile 20 to mile 102. (Aug. 23, p. 215.)

BATON ROUGE, HAMMOND & EASTERN.—See Illinois Central.

BOSTON & MAINE.—The double-track work between Johnsonville, N. Y., and Troy, about 16 miles, which was started in April, 1907, has been finished and was put in operation last month. The method of abolishing 19 grade crossings between these points has not yet been decided upon.

BRITISH COLUMBIA (ELECTRIC).—Bids, it is said, will shortly be asked for by this company to build about 63 miles through southern British Columbia. Work to be started this spring. R. H. Sperling, General Manager, Vancouver, B. C.

CANADIAN PACIFIC.—This company has been granted an extension of four years to complete the Esquimalt & Nanaimo branch. Location work is about finished and it is expected to ask bids for building the line this month. Contracts for 10 miles from Wellington, B. C., have been let to John Bright, of Nanaimo, and a contract has been given to A. Carmichael to secure the right-of-way. (Dec. 13, p. 732.)

This company, it is said, will this spring extend the line with present terminus at Nominique, Que., west to the line with northern terminus at Maniwaki, 41 miles.

CHARLESTON, PARKERSBURG & WESTERN.—An officer writes that this company has 30 miles of track laid on the line it is building from Charleston, W. Va., north via Sissonville, Spencer and Palestine to Parkersburg, about 60 miles. Some engineering work is now under way on the rest of the line, but it is undecided when grading will be begun. C. P. Peyton, Chief Engineer, Charleston.

DURHAM & SOUTHERN.—This company last year carried out revision work on six miles of its line between Apex, N. C., and Angier.

FAIRCHILD & NORTH CAROLINA.—This company is building with its own men a yard about one mile long at Owen, Wis.

ILLINOIS CENTRAL.—The Baton Rouge, Hammond & Eastern is to be operated by the Yazoo & Mississippi Valley beginning Feb. 27. Work is to be rushed on the section from Baton Rouge, La., east to Covington, 65 miles, of which 20.75 was built in 1907. (Nov. 22, p. 636.)

INDIANAPOLIS, LOGANSPOUT & CHICAGO.—This company, which has projected a line from Logansport, Ind., south to Indianapolis, 66 miles, has all the surveys made and rights of way for 25 miles and franchises for entering Indianapolis secured. Grading has been finished on 2½ miles at Indianapolis. Contracts for this work have been let. Walter Osmer, Chief Engineer, Logansport, Ind. The line is eventually to be extended, to have a total of 163 miles in Indiana and 23 in Illinois. (May 10, p. 663.)

MISSISSIPPI CENTRAL.—Contract is reported let by this company to O. A. Gibson to build 14 miles of its road from Roxie, Miss., east toward Brookhaven.

MISSOURI & NORTH ARKANSAS.—This company now operates 130 miles of railroad from Seligman, Mo., southeast to Leslie, Ark. Track-laying is just being finished on 31½ miles from Woodruff, which is nine miles north of Seligman, on the St. Louis & San Francisco, northwest to Neosho, where connection will be made with the Kansas City Southern, over which the company has trackage rights into Joplin. The roadbed for 100 miles south of Leslie is being graded by M. C. Burke and L. S. Joseph; 26 miles of track is laid and the grade is practically ready for 20 miles more. It is expected to finish track-laying on this section by July. From Kensett for 30 miles southeast toward Helena grading contracts are let for 14 miles to the Dalhoff Construction Co., of Little Rock, Ark., and the next 15 miles, one-half to the Alabama Construction Co. and one-half to James Dishman. These firms are putting up the embankment across the White and Cache river bottoms with revolving derricks and Page buckets. From Cotton Plant to Helena, 55 miles, grading is 80 per cent. done and track material is being received. It is the intention of the company to finish connecting links for a through line from Joplin to Helena, 361 miles, about Oct. 1 next.

NEW YORK SUBWAYS.—The New York State Public Service Commission of the First district has approved the plans for the Broadway-Lexington avenue subway from the Battery, at the south end of Manhattan Island north, under Church and Vesey streets to Broadway, thence under Broadway and Lexington avenue to the Bronx side of the Harlem river, where it will branch into two spurs, one to Woodlawn Cemetery and the other to Pelham Bay Park. The estimated cost of the work with a line across the Island at Canal street is \$67,000,000. The Commission passed a resolution

asking the Board of Estimate to assent to the scheme. This consent is necessary because the new route is made up of several modifications of roads laid out by the old Rapid Transit Commission and approved at the time by the Board of Estimate. As soon as the Board of Estimate approves, the Public Service Commission will begin obtaining the necessary consents from property owners, and when these are received will probably advertise for bids. (Jan. 10, p. 73.)

NORTHERN OF MAINE.—Grading is to be started about May 1 on this proposed line, projected from Van Buren, Me., west along the northern boundary of Maine via Grand Isle, Madawaska, Frenchville, Fort Kent and St. John to St. Francis, 62 miles, for which contracts are to be let soon. The work will include one bridge. Edson E. Goodrich, President, Waterville, and Henry F. Hill, Chief Engineer.

OWENSBORO & ROCKPORT BRIDGE & TERMINAL COMPANY.—Plans and specifications are nearing completion and work is expected to be started this year on this proposed line from Owensboro, Ky., north to Rockport, Ind., 12 miles. A. H. Kennedy, President; G. H. Cox, Secretary, Owensboro. (May 24, p. 727.)

PADUCAH NORTHERN.—Incorporated in Kentucky to build a line from Paducah west 13 miles to a point on the Ohio river, where, it is said, the Chicago, Burlington & Quincy and the Cleveland, Cincinnati, Chicago & St. Louis will build a bridge. The company is also to have terminals in Paducah, and its tracks are to be used for an entrance into that city by the C., C. & St. L. and the C. & E. I. Surveys are being made. It is reported that the Burlington has projected an extension from Herrin, Ill., to the Ohio river, and will use the tracks of the Paducah Northern into Paducah. G. C. Wallace, President; E. Palmer, First Vice-President; L. M. Rieke, Second Vice-President; M. O. Overly, Secretary, and J. C. Utterback, Treasurer, Paducah.

PARRAL & DURANGO.—This company, which last year built three miles of railroad south of Mesa de Sandia, Durango, has work under way on about nine miles from Kilometer 80 to Paraje Seco. Contract let to R. M. Dudley, of Mesa de Sandia. An extension is projected from Kilometer 95 to Guanacevi, about 115 miles.

PAYETTE VALLEY.—Surveys are being made by this company for an extension from New Plymouth, Idaho, southeast to Falk's Store, seven miles.

PENINSULA RAILWAY (ELECTRIC).—An officer writes that this company, which started work and finished about eight miles from Bartow, Fla., west to Mulberry, last year, has rights-of-way secured and 1,000 tons of rails on hand. The company expects to begin work soon on the remaining 37 miles to finish the line to Tampa. At Mulberry the company has its power stations. The Florida Engineering Company is the resident engineer and W. H. Evers, Bartow, is Chief Engineer.

QUEBEC & NEW BRUNSWICK.—Application is being made to Parliament for permission to build a line from a point near St. Johns Junction, Que., to the State of Maine boundary, and to secure trackage rights over any road in that state. Hon. J. Costigan is President.

ROBERT LEE, FORT CHADBURNE & EASTERN.—This company is building a line from Robert Lee, Tex., northeast via Rawlings to Winters, 35 miles. Work was started last December by J. E. Hunter, of Robert Lee, who has the contract on the section from Robert Lee to Rawlings, 13½ miles. Grading has been finished for 2¼ miles. Additional contracts are to be let during the first half of this year. The company is planning to make other extensions for which definite plans have not yet been decided upon. J. Austin Spencer, President, and S. J. Bross, Chief Engineer, Robert Lee.

ROODHOUSE & VIRDEN RAILWAY.—See St. Louis, Terre Haute & Quincy Traction.

ST. LOUIS, TERRE HAUTE & QUINCY TRACTION.—This company has been incorporated in Illinois with \$50,000 capital to build an electric line from Quincy, Ill., southeast and then east to Taylorville, 143 miles. Surveys finished and franchises secured for the entire line and all the rights-of-way secured or guaranteed. E. Yates, President; H. C. Simons, Vice-President; F. W. Knollenberg, Secretary and Treasurer, and G. H. Lawrence, Chief Engineer. Parts of the line are to be built under the names of the Roodhouse & Virden Railway and the Virden & Taylorville Traction, which see below.

Surveys and estimates have been finished by the Roodhouse & Virden Railway, and it is expected to begin work early this year on its proposed electric line from Roodhouse, Ill., east to Virden, 33 miles. H. C. Simons, President, Virden.

The Virden & Taylorville Traction expects to begin grading work early this year on its proposed electric line from Virden, Ill., east to Taylorville, 28 miles, with a branch for which surveys have been made north to Divernon, four miles. The work includes a bridge over the Sangamon river. J. Gelder, President, and G. H. Lawrence, Chief Engineer.

SAVANNAH, AUGUSTA & NORTHERN.—An officer writes that this company is making surveys to build from Savannah, Ga., northwest

to Chattanooga, Tenn., with an extension east to Augusta, Ga., in all 425 miles. Grading finished on 58 miles and track laid on 30 miles between Statesboro, Ga., and Garfield. Contracts let to W. J. Oliver, of Knoxville, Tenn. W. H. Lynn, 111 Broadway, New York, is interested.

SPOKANE & INLAND EMPIRE (ELECTRIC).—This company, which built 50½ miles of extensions to its line in Washington last year, has given contracts to Grant, Smith & Co., of Rosalia, Wash., to build an extension of its eastern division from Palouse, Wash., south-east to Moscow, Idaho, 15½ miles.

TAMPA NORTHERN.—This company, which built 39 miles of road in Florida last year, has given a contract to B. H. Hardaway, of Columbus, Ga., for building nine miles from Enville Junction, Fla., to Brooksville. Surveys under way from Brooksville north to Thomasville, Ga.

TUSCALOOSA BELT RAILWAY.—Contracts have been given by this company to the Birmingham & Gulf Construction Company, Birmingham, Ala., for building its proposed line from Tuscaloosa, Ala., northeast to Gadsden, 120 miles. Eleven miles in operation in Tuscaloosa. Geo. H. Ross, Superintendent, Tuscaloosa.

VALLEY RIVER.—This company, which was incorporated last year to build a line from Mill Creek, W. Va., south to Clover Lick, 43 miles, for which surveys have been made, has work under way on the line from Mill Creek south to Valleyhead. (Dec. 6, p. 702.)

VIRDEN & TAYLORVILLE TRACTION.—See St. Louis, Terre Haute & Quincy Traction.

WALCOTTVILLE & COLDWATER.—An officer writes that this company will build its proposed line from Walcottville, Mo., to Coldwater, 30 miles, during 1908. O. G. Wales, Kansas City, Mo., is interested.

WESTERN ILLINOIS & IOWA (ELECTRIC).—Incorporated in Illinois with \$2,500,000 capital to build an electric line in Hancock county. The incorporators are P. A. Neuffer, J. E. Hauronick, H. H. Phillips, C. J. Horn and R. M. Cole, all of Chicago.

WOLF, MAGANTIC & LOTBINIERE.—This company, which was chartered to build a line from Lime Ridge, Wolf county, Que., north toward Quebec, about 100 miles, has surveys made from Lime Ridge to Lyster, 60 miles. A charter has also been granted to continue the line from Lime Ridge south to Sherbrooke, 20 miles. The company will apply at the next session of the legislature for subsidies, and if its application is granted it is expected to begin construction work early this spring. W. H. Lamby, Secretary, Inverness, Que.

RAILROAD CORPORATION NEWS.

ATCHISON, TOPEKA & SANTA FE.—December gross earnings increased 2 per cent. and net earnings after taxes decreased 13 per cent. The operating ratio for the month was 70 per cent., against 75 per cent. in November, 1907, and 64 per cent. in December, 1906.

See Houston Belt & Terminal.

BUFFALO, ROCHESTER & PITTSBURGH.—William A. Read & Co., New York, have offered at 101½, yielding nearly 4½ per cent., \$500,000 consolidated mortgage 4½ per cent. bonds due 1957, a legal investment for savings banks in New York and Connecticut.

CANADIAN PACIFIC.—Gross earnings for December were \$6,400,000, against \$6,000,000 in 1906. Net earnings were \$2,100,000, against \$2,300,000 in 1906. For the six months ended December 31, 1907, net earnings were \$14,430,000, against \$14,590,000 in 1906.

CHESAPEAKE & OHIO.—Gross earnings for December were \$2,142,000 against \$2,052,000 in 1906, an increase of 4 per cent. Net earnings were \$573,000 against \$735,000 in 1906, a decrease of 22 per cent. For the six months ended December 31, 1907, net earnings were \$5,248,000 against \$4,730,000 in 1906.

CHICAGO & MILWAUKEE ELECTRIC.—On January 28 receivers were appointed for this road. An earlier receivership was instituted on the evening of December 31, 1907, but after the road had been for less than three days in the hands of its President, A. C. Frost, as receiver, this was terminated. The institution of this receivership played a large part in injuring the company's credit. It was impossible to sell bonds to get funds to finish the extension to Milwaukee. There are only about eight miles of this to be finished, more than half of the work on which has been done. The total cost of completing the extension, according to President Frost, would be about \$250,000. The receivers appointed by Judge Grosscup in the United States Circuit Court at Chicago were as follows: W. Irving Osborne, Vice-President of the Central Trust Co., of Chicago; D. B. Hanna, Third Vice-President of the Canadian Northern Railway, and Albert C. Frost, President of the company. Owing to objections raised to the appointment of Mr. Frost, he withdrew on January 31 and was succeeded by H. A. Haugan, President of the State

Bank of Chicago. Receivers were also appointed for A. C. Frost & Co., and a receivership suit was brought against the Republic Construction Co., which was building the Milwaukee extension.

CHICAGO & WESTERN INDIANA.—Proctor & Borden and Potter, Choate & Prentice, New York, have offered at 95 and interest, to yield 4¼ per cent., \$400,000 consolidated mortgage 4 per cent. bonds due 1952 of the Chicago & Western Indiana, guaranteed by the Chicago & Eastern Illinois, the Wabash, the Grand Trunk Western, the Chicago & Erie and the Chicago, Indianapolis & Louisville.

CHICAGO, MILWAUKEE & ST. PAUL.—President Earling is quoted as having said at Seattle on January 31 that negotiations have been made for a line of steamships between Puget Sound and the Orient. J. W. Hiland, Third Vice-President, and F. A. Miller, General Passenger Agent, have gone to China and Japan to investigate traffic conditions. The establishment of the line depends on their report.

CHICAGO RAILWAYS.—The North Chicago and the West Chicago Street Railroads were on January 25 sold at foreclosure sale to representatives of the protective committee. These two companies are to be taken over by the Chicago Railways Company. N. W. Harris & Co. and the National City Bank of New York are to buy the \$12,000,000 first mortgage bonds provided for in the reorganization plan for the rehabilitation of these properties. These bonds will be a first mortgage on 300 miles of track, serving without competition the north and west side of Chicago, embracing a territory with a population of 1,500,000.

COLORADO & SOUTHERN.—Gross earnings of the system for December increased 17 per cent. and net earnings 26 per cent. For the six months ended December 31, 1907, gross earnings increased 16 per cent. and net earnings 21 per cent.

See Houston Belt & Terminal.

DELAWARE & HUDSON.—Railroad gross earnings for December increased 15 per cent. and railroad net earnings 5 per cent. There was a decrease of 77 per cent. in net earnings of the coal department, so that there was a final decrease of 17 per cent. in net earnings of all departments.

For the year ended December 31, 1907, railroad gross earnings were \$20,100,000, against \$17,000,000 in 1906, an increase of \$3,100,000, or 18 per cent. Expenses and taxes increased \$1,500,000, leaving \$8,000,000 as the net earnings of the railroad department, an increase of \$1,600,000, or 25 per cent. over 1906.

DETROIT, TOLEDO & Ironton.—On February 1, George K. Lowell, Vice-President and General Manager, and Benjamin S. Warren, General Counsel, were appointed receivers by the United States Circuit Court at Detroit, Mich., following default on \$2,776,400 consolidated mortgage 4½ per cent. bonds on which semi-annual interest fell due February 1. The company's directors impute the receivership directly to adverse railroad legislation, particularly that section of the Rate Law which prohibits a railroad from having any interest in coal properties except for its own use. The income results for the year ended June 30, 1907, were however, very unsatisfactory. In 1905 the Detroit, Toledo & Ironton was reorganized from the Detroit Southern and control of the Ann Arbor was acquired, making a through line from Ironton, on the Ohio river, north to Ann Arbor, on Lake Michigan. The owners planned to develop the combined property by an extension across the Ohio river at Ironton, Ohio, to coal lands in northern Kentucky, on which it had acquired options. A bridge at Ironton was begun. The Detroit, Toledo & Ironton itself operates 438 miles of road, and, including the Ann Arbor, 734 miles.

GEORGIA SOUTHERN & FLORIDA.—Samuel F. Parrott, Vice-President of the Georgia Southern & Florida, was, on February 3, appointed receiver of the Macon & Birmingham, which has since February 1, 1904, been operated by the Georgia Southern & Florida. The Macon & Birmingham operates 105 miles from Macon, Ga., to La Grange.

GULF & SHIP ISLAND.—Cramp, Mitchell & Shober, Philadelphia, have offered, to yield 6¼ per cent., \$460,000 5 per cent. car trust bonds maturing semi-annually to 1918, secured on

500 freight cars at \$774 each.....	\$387,000
3 passenger coaches at \$6,900 each.....	20,700
1 chair car at.....	12,740
1 combination baggage car at.....	5,195
1 baggage car at.....	4,755
2 passenger locomotives at \$15,500 each.....	31,000
6 freight locomotives at \$15,250 each.....	91,500

Total.....\$552,890

The excess of 17 per cent. is being paid by the railroad company.

GRAND TRUNK PACIFIC.—On January 14 this company offered at 94 in London \$5,000,000 (£1,000,000) 4 per cent. debenture stock ranking equally with the same amount already issued and guaranteed by the Grand Trunk. The proceeds are for additional rolling stock, which is to be used by the Grand Trunk until it

is required by the Grand Trunk Pacific. The advertisement offering the stock says that about 800 miles of the Grand Trunk Pacific will be ready for traffic this fall.

HOCKING VALLEY.—In December, gross earnings decreased 13 per cent. and net earnings 65 per cent. The decrease in net earnings was more than compensated by an increase in other income.

HOUSTON BELT & TERMINAL.—The Houston Belt & Terminal Company, of which the Santa Fe, the St. Louis & San Francisco, the Trinity & Brazos Valley and the St. Louis, Brownsville & Mexico, are owners is to take over the Houston terminal property of the Gulf, Colorado & Santa Fe as the nucleus of important terminals to be built at a cost of several million dollars.

ILLINOIS CENTRAL.—Gross earnings for the six months ended December 31, 1907, increased 5 per cent.; net earnings decreased 11 per cent.

INTERNATIONAL & GREAT NORTHERN.—Estimated gross earnings for the week ended January 31, 1908, were \$195,000, against \$311,000 in 1907. This is a decrease of 37 per cent.

LOUISIANA & ARKANSAS.—Gross earnings for December were \$64,188; operating expenses were \$63,986, and net earnings were \$202, against \$16,643 in 1906, a decrease of 99 per cent. For the six months ended December 31, 1907, net earnings were \$184,000, against \$177,000 in 1906.

MACON & BIRMINGHAM.—See Georgia Southern & Florida.

MEXICAN CENTRAL.—See National Railways of Mexico.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—By reason of comparison with a time of severe winter weather in 1906, this company shows a large increase in net earnings for December, which were \$512,000, against \$350,000 in 1906. The operating ratio was 52.7 per cent. in 1907 and 61.9 in 1906.

NATIONAL RAILWAYS OF MEXICO.—Earnings in December, 1907, increased as follows over those for December, 1906:

On the National of Mexico there was an increase of 2 per cent. in gross earnings and a decrease of 4 per cent. in net earnings.

On the Mexican International there was a decrease of 5 per cent. in gross earnings and a decrease of 20 per cent. in net earnings.

On the Interoceanic of Mexico there was an increase of 8½ per cent. in gross earnings and 17 per cent. in net earnings.

On the Hidalgo & North-eastern there was a decrease of 7 per cent. in gross earnings and of 9 per cent. in net earnings.

On the Mexican Central there was an increase of 23 per cent. in gross earnings and 8 per cent. in net earnings. Gross earnings of the Mexican Central for the six months ended December 31, 1907, increased 28 per cent. and net earnings 31 per cent.

NEW YORK CITY RAILWAY.—The Metropolitan Street Railway has defaulted the semi-annual interest, due February 1, on its outstanding \$12,500,000 general collateral trust mortgage 5 per cent. bonds.

NEW YORK, NEW HAVEN & HARTFORD.—Gross earnings for the six months ended December 31, 1907, were \$29,500,000; net earnings were \$9,100,000. For the six months ended December 31, 1906, gross earnings were \$28,300,000 and net earnings were \$10,400,000. In 1907 the figures were compiled according to the Interstate Commerce Commission rulings.

NORFOLK & WESTERN.—Passenger earnings for December decreased 2 per cent.; freight earnings, 10 per cent., and gross earnings, 8 per cent. Operating expenses increased 4 per cent., leaving a decrease of 30 per cent. in net earnings. The operating ratio was 73 per cent., against 65 per cent. in 1906. For the six months ended December 31, 1907, gross earnings increased 13 per cent. and net earnings 5 per cent.

PENNSYLVANIA.—Shipments of coal and coke originating on the lines of the Pennsylvania Railroad east of Pittsburgh and Erie, were 3,050,000 tons for the 1908 year to January 25. For the 1907 year to January 26 they were 4,127,000 tons.

Gross earnings of the Lines East of Pittsburgh and Erie directly operated by the Pennsylvania Railroad for the year ended December 31, 1907, were \$164,800,000, against \$148,200,000 in 1906, an increase of \$16,600,000, or 11 per cent. Operating expenses increased \$17,800,000, or 17 per cent., leaving a decrease of \$1,200,000, or 3 per cent. in net earnings.

Gross earnings of the Lines West directly operated by the Pennsylvania Company for the year ended December 31, 1907, were \$54,200,000, an increase of \$8,100,000, or 12 per cent. over 1906. Net earnings were \$14,400,000, an increase of \$12,000, or 9 per cent. over 1906.

READING COMPANY.—The Philadelphia & Reading Railway is one of the very few companies to show an increase in net earnings for December, which were \$1,274,000, against \$1,218,000 in 1906. This is particularly noticeable because gross earnings show a slight decrease.

ST. LOUIS & SAN FRANCISCO.—This company has sold \$3,000,000 6 per cent. seven months' notes dated January 29, 1907, to Hallgarten & Co., of New York. These notes are issued in denominations of \$50,000 and are subject to call on five days' notice in sums or multiples of \$150,000. All have been sold, partly in Europe.

See Houston Belt & Terminal.

ST. LOUIS, BROWNSVILLE & MEXICO.—See Houston Belt & Terminal.

SOUTHERN.—Gross earnings for December decreased 14 per cent.; net earnings 30 per cent. and net earnings after taxes 38 per cent. The operating ratio was 82 per cent. against 75 per cent. in 1906. For the six months ended December 31, 1907, there was an increase of 4 per cent. in gross earnings and 8 per cent. in operating expenses. Net earnings decreased 8 per cent.; taxes increased 33 per cent. and net earnings after taxes decreased 12 per cent.

See Georgia Southern & Florida.

SOUTHERN PACIFIC.—Gross earnings for December were \$11,073,000 against \$10,995,000 in 1906. Net earnings were \$3,319,000 against \$4,044,000 in 1906. For the six months ended December 31, 1907, gross earnings were \$69,100,000 against \$62,100,000 in 1906. Net earnings were \$20,084,000 against \$24,355,000 in 1906. The following official statement is made covering both the Southern Pacific and Union Pacific:

In 1906 only the net revenue from the operation of dining cars, hotels and other facilities used in connection with the transportation lines of the companies was included in the transportation operations. The classification of the Interstate Commerce Commission in effect since July 1, 1907, deals with this revenue as "outside operations," and in thus dealing with it, the revenue is included in the gross revenue and the expenses in the operating expenses. To bring last year's gross revenue and expenses in respect of these "outside operations" in accord with those of this year, the gross revenue expenses for the five months ended November, 1906, in the case of the Union Pacific were increased \$414,134, and in the case of the Southern Pacific were increased \$595,603. Net revenue for Union Pacific amounting to \$61,800 and for Southern Pacific amounting to \$94,573, is already included in the gross revenue.

SOUTHERN RAILWAY.—A. B. Andrews, First Vice-President, was on January 27 appointed receiver of the Tallulah Falls Railway. On January 6 receivers were appointed by a Georgia state court, but these receivers were discharged later in the month. The Tallulah Falls owes about \$1,500,000 to the Southern Railway for advances. The application for a receiver was made by the Southern Railway. The Tallulah Falls runs from Cornelia, Ga., north through Rabun gap, to Franklin, N. C., 60 miles. According to the last annual report of the Southern, the Tallulah Falls is eventually to be used as part of a low grade through line from Maryville, Tenn., via Bushnell and Franklin, N. C., between "the Knoxville territory and north and west thereof" and "the consuming territory of Georgia and South Carolina, avoiding the necessity of handling traffic over the heavier grades via Asheville and Spartanburg."

TALLULAH FALLS.—See Southern Railway.

THIRD AVENUE RAILROAD.—Frederick W. Whitridge, receiver of this company, was on February 1 appointed receiver also of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, and the Dry Dock, East Broadway & Battery, which own street railway lines in New York City. The Third Avenue Railroad owns nearly all the stock of both companies. The Forty-second street company operates 24½ miles of track. Control was bought by the Third Avenue in November, 1905. The company was in the hands of a receiver from March, 1900, to April, 1901. The Dry Dock company has 17½ miles of track. The Third Avenue bought control in 1897.

TOLEDO & OHIO CENTRAL.—On February 1 the Toledo & Ohio Central assumed the operation of the Marietta, Columbus & Cleveland, which runs from Marietta, Ohio, to Palos, on the Toledo & Ohio Central, 45 miles, with a 4-mile branch.

UNION PACIFIC.—Gross earnings for December were \$6,530,000 against \$6,380,000 in 1906. Net earnings were \$2,635,000 against \$2,894,000 in 1906. For the six months ended December 31, 1907, gross earnings were \$42,900,000 against \$39,000,000 in 1906, and net earnings \$17,600,000 against \$19,000,000 in 1906. See Southern Pacific.

The suit brought by the United States Government to set aside the Union Pacific's control of the Southern Pacific and the San Pedro, Los Angeles & Salt Lake and its stock holdings in other transcontinental lines was filed on February 1 at Salt Lake City.